

Installing and Customizing the AIX Operating System

Programming Family



Installing and Customizing the AIX Operating System

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IBM

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Portions of the code and documentation described in this book were developed at the Electrical Engineering and Computer Sciences Department at the Berkeley Campus of the University of California under the auspices of the Regents of the University of California.

The Rand MH Message Handling System was developed by the Rand Corporation and the University of California.

This edition applies to Version 2.2.1 of the IBM AIX Operating System. Changes are made periodically to the information herein; these changes will be reported in technical newsletters or in new editions of this publication.

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About This Book

Purpose

This book discusses how to install the IBM RT system Advanced Interactive Executive Operating System (AIX) and how to customize your IBM RT system to suit your needs. The step-by-step instructions enable you to install the AIX Operating System with IBM-supplied defaults or to change those defaults. The AIX Operating System consists of the operating system kernel, operating system Virtual Resource Manager Program (VRM), and several additional operating system programs.

With the **devices** command, you can customize your RT system by adding or deleting various components or by changing information about those components. The **minidisks** command enables you to add, delete, or modify user-defined minidisks (divisions on the fixed disks in your system).

Who Should Read This Book

This book is designed both for those who are unfamiliar with computer systems and for those who have computer systems experience. The step-by-step instructions explain how you can install the operating system and how you can change choices to suit your own system needs. The AIX Operating System is based on UNIX System V.

Before You Begin

Before you use the instructions in this book, make certain that your IBM RT system hardware is installed. You should also be familiar with your system keyboard and have the AIX Operating System diskettes at hand.

How to Use This Book

The operating system installation program is menu-driven; that is, you will be presented with a list of items from which you are to choose. After you select an item and press **Enter**, you may be asked to supply information. But the installation procedures are set up for you.

Before you select an option, you should read enough about the various installation options to understand exactly what each option does. Then, knowing your own system needs and requirements, you can decide which option to choose.

The same guidelines apply to the chapters on using the **devices** and **minidisks** commands. You should understand the various options before selecting one. Understanding how the **minidisks** command works is especially important. The more early planning you do for arranging the minidisks on your fixed disk, the more time you will save later.

Chapter 1, "Planning for Installation," explains how to plan ahead for minidisk space allocation. It gives an overview of code service and describes the types of minidisks used on the RT system, the data capacity of the available fixed disks, and the minidisk space requirements for Base System Program files and optionally available licensed programs.

Chapter 2, "Getting Ready to Install the AIX Operating System," introduces the operating system and its functions. It also discusses which keys on your IBM RT you will use to install the AIX Operating System. In addition, it explains how to turn on the system and how to handle and load your diskettes.

Chapter 3, "Installing the VRM Program," shows you how to select the keyboard layout you want to use with your RT system and guides you through three options in the installation program. These options are installing the VRM with current choices, showing current and recommended choices, and changing current choices and installing the VRM.

Chapter 4, "Installing the Base System Program," discusses how to install the Base System Program with defaults; it also discusses how to see and change values for the AIX minidisks.

Chapter 5, "Installing Additional Operating System Programs," discusses how to install the additional programs that are part of the operating system. It also explains how operating system programs are updated from time to time.

Chapter 6, "Customizing System Devices," discusses how you can add, delete, or change information about IBM RT devices.

Chapter 7, "Customizing System Minidisks," discusses how to add, change, and delete user-defined minidisks on system fixed disks.

Appendix A, "Enlarging the VRM and Page Space Minidisks," discusses the VRM defaults and steps to increase the size of the VRM minidisk and the page space minidisk. This procedure involves backing up files from one or more minidisks, deleting minidisks, creating new minidisks, and restoring files.

Appendix B, "Keyword Descriptions," describes the most common *keywords* found in device-dependent information files. These keywords identify attributes, especially for printers, that you can change to suit your needs. Understanding how the keywords relate to specific devices and commands helps you know whether you want to change the settings.

Appendix C, "Special Processing for Devices and Minidisks," discusses how to change some files in order to complete the special processing that occurs when you add or delete certain system devices and add minidisks.

Appendix D, "Installing the VRM with Non-IBM RT Display," explains how to install the VRM if you have a display produced by another manufacturer or produced by IBM (but not supported for use with the IBM RT system).

Appendix E, "Conflicting Adapter Levels," discusses conflicts that you might encounter with the various adapters that you install in your system. This appendix helps you prepare for and correct these conflicts during installation.

The Glossary defines terms that you may find unfamiliar. Terms appearing in bold italics in the book are defined in the Glossary.

A Reader's Comment Form and a Book Evaluation Form are provided at the back of this book. Use the Reader's Comment Form at any time to give IBM information that may improve this publication. After you become familiar with the book, use the Evaluation Form to give IBM specific feedback about the book.

How Each Chapter Is Organized

Most of the chapters have the same basic structure. For each major task, you will find a brief discussion of the task and a quick-reference box containing the steps for performing that option. For some tasks, you also will see additional screens and technical information under the heading “More Detailed Information.”

Typically, the quick-reference box contains no examples of screens or additional information. It serves only as a reference or as a reminder of the basic steps. Here is an example:

To Get Ready to Install

1. Turn the key to the unlocked position.
2. Turn on the power switches.
3. Insert the Installation/Maintenance diskette into the top diskette drive, and close the lever.
4. Press **Ctrl-Alt-Pause**.

You may want to read all of the information on the task before you do it. Remember, the quick-reference box is only for reference. It should not take the place of the examples and explanations in the “More Detailed Information” sections.

Highlighting

This book uses different type styles to distinguish among different kinds of information. General information is printed in the standard type style (the style used for this sentence). The following type styles indicate other types of information:

Type Style	Description
Bold	Keys, commands, flags, keywords, and names supplied with or created by the system appear in bold type.
<i>Bold Italic</i>	New terms introduced in the text appear in <i>bold italic</i> type and are defined in the glossary.
Monospace Color	Text that you type or that shows on your display screen appears in monospace color.

Related Information

For additional information, you may want to use other guides and reference materials. Here are items you may find useful:

- *IBM RT General Information* gives an overview of the RT's hardware, software, and communications facilities. It also includes information on international character support. This manual is intended to provide information to help you decide whether to buy an RT.
- *IBM RT Planning Guide* provides information for site planning and preparation, software planning, and communications planning. The site planning and preparation information includes some physical specifications of the RT system units, devices, and cables. The software planning information includes prerequisites, corequisites, and recommended memory for certain software products. The communications planning information includes prerequisites, corequisites, and network configuration requirements of certain communications products. This book should be consulted before ordering RT products.
- *IBM RT Guide to Operations* describes the IBM 6151 and IBM 6150 system units, the displays, keyboard, and other devices that can be attached. This guide also includes procedures for operating the hardware and moving the IBM 6151 and IBM 6150 system units.
- *IBM RT Problem Determination Guide* provides instructions for running diagnostic routines to locate and identify hardware problems. A problem determination guide for software and three high-capacity (1.2MB) diskettes containing the IBM RT diagnostic routines are included.

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- *IBM RT Using the AIX Operating System* describes using the AIX Operating System commands, working with file systems, developing shell procedures, and using data communications facilities.
 - *IBM RT AIX Operating System Technical Reference* is a four-volume set.
 - System Calls and Subroutines*, describes the system calls and subroutines that a C programmer uses to write programs for the AIX Operating System.
 - Files and Extensions*, contains information about the extensions to the kernel and base operating system, including file formats, special files, and GSL subroutines.
 - VRM Programming Support*, describes the VRM programming environment, including the internal VRM routines, VRM floating-point support, use of the VRM debugger, and the supervisor call instructions that form the Virtual Machine Interface.
 - VRM Device Support*, describes device IPL and configuration, minidisk management, the virtual terminal and block I/O subsystems, as well as the interfaces to VRM device driver and data link control components. This volume also describes the programming conventions for developing your own VRM code and installing it on the system. (Available optionally)
 - *IBM RT Managing the AIX Operating System* provides instructions for performing such system management tasks as adding and deleting user IDs, creating and mounting file systems, repairing file system damage, and managing data communications facilities.
 - *IBM RT AIX Operating System Commands Reference* lists and describes the AIX Operating System commands.
 - *IBM RT Usability Services Guide* shows how to create and print text files, work with directories, start application programs, and do other basic tasks with Usability Services. (Packaged with *Usability Services Reference*)
 - *IBM RT Usability Services Reference* supplements *IBM RT Usability Services Guide* by including information on using all of the Usability Services commands. (Packaged with *Usability Services Guide*)
 - *IBM RT Messages Reference* lists messages displayed by the IBM RT and explains how to respond to the messages.
 - *IBM RT INed* provides guide and reference information for using the INed program to create and revise files.
 - *IBM RT Bibliography and Master Index* provides brief descriptive overviews of the books and tutorial program that support the IBM RT hardware and the AIX Operating System. In addition, this book contains an index to the RT and AIX Operating System library.
 - *IBM RT Using DOS Services* provides step-by-step information for using AIX Operating System DOS Services. (Available optionally; packaged with *IBM RT DOS Services Reference*)

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- *IBM RT DOS Services Reference* provides reference information about the AIX Operating System DOS Services. This book also includes information on sharing DOS files with Personal Computer AT Coprocessor Services, and on the differences between PC DOS and DOS Services. (Available optionally; packaged with *IBM RT Using DOS Services*)
 - *IBM RT Keyboard Description and Character Reference* describes the national character and keyboard support for the 101-key, 102-key, and 106-key keyboards, including keyboard position codes, keyboard states, control code points, code sequence processing, and nonspacing character sequences. (Available optionally)

Ordering Additional Copies of This Book

To order additional copies of this publication (without program diskettes), use either of the following sources:

- To order from your IBM representative, use Order Number SBOF-1817.
- To order from your IBM Authorized RT Dealer, use Part Number 27F4352.

A binder, Library Overview Card, and Bibliography and Master Index are included with the order.

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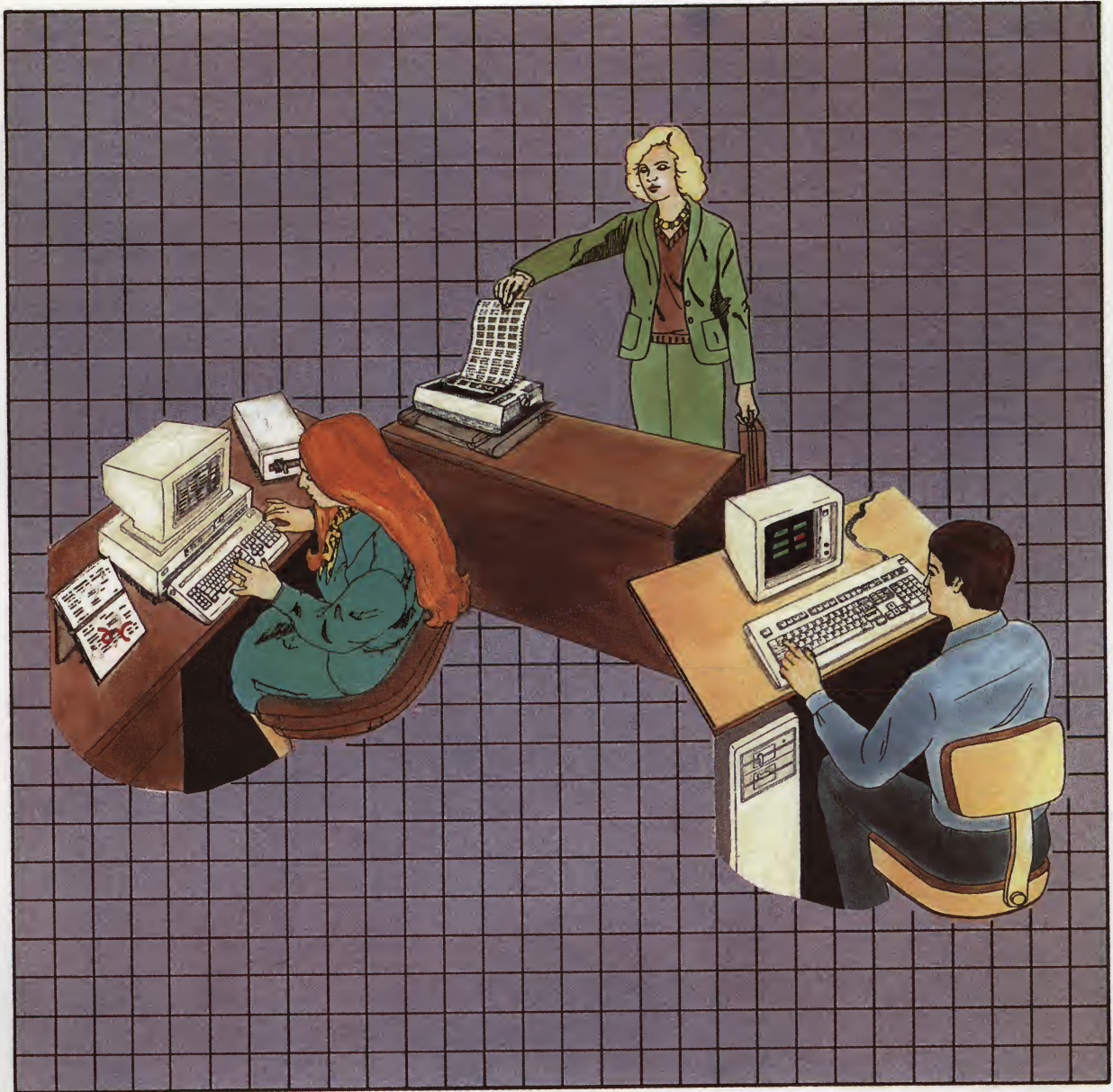
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Chapter 1. Planning for Installation



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About This Chapter

This chapter describes the following:

- Types of RT software
- Planning for software installation
- Code service definitions and required support programs
- The types of minidisks used on the RT system
- The data capacity of the available RT fixed disks
- Using the minidisk space requirement worksheets.

Understanding RT Software

The RT system uses two basic types of software. They are:

1. Operating system

The **operating system** is the software that directs and controls the hardware and software in the computer system where the operating system resides, by providing services such as resource allocation, scheduling, input/output control, and data management. The operating system for the RT system is the IBM RT Advanced Interactive Executive Operating System (AIX) licensed program. Figure 1-2 on page 1-17 lists all the AIX Operating System components.

2. Licensed programs

A **licensed program** is a program or group of programs that performs a particular task. Licensed programs are optionally available products for which the user pays a license fee. The programs themselves remain the property of the licensor.

Licensed programs available from IBM for the RT system include, but are not limited to, the following:

- AIX X-Windows
- AIX/RT Network File System (NFS)
- AIX/RT Personal Computer AT Simulator
- Applix IA
- Architecture & Engineering Series
- BASIC Interpreter and Compiler
- CAEDS (Computer-Aided Engineering Design System) for the RT system
- CATIA for the RT system
- CIEDS (Computer-Integrated Electrical Design Series) for the RT system
- Common Lisp for the IBM RT system
- Data Management Services
- Distributed Services
- FORTRAN 77
- IBM Interleaf Publishing Series
- IMSL Problem Solving Systems
- INGRES
- INmail/INnet/FTP

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- NETWORK 3270-PLUS (SNA)
 - NETWORK 3270-PLUS (BSC)
 - NETWORK RJE-PLUS (SNA)
 - NETWORK RJE-PLUS (BSC)
 - ORACLE
 - Pascal
 - Personal Computer AT Coprocessor Services
 - PERSONAL graPHIGS
 - PROFESSIONAL CADAM
 - Professional Graphics Series
 - RM/COBOL
 - RT Publishing Software
 - SAMNA PLUS IV
 - SOLOMON III
 - UNIRAS
 - VS FORTRAN 77
 - VS Pascal
 - Workstation Host Interface Program
 - 3278/79 Emulation.

For a complete list of software for the RT system, see the *IBM RT Personal Computer Hardware/Software Catalog*, GH23-0150.

For more information on any of these programs, see the documentation for the specific program.

Random Access Memory Recommendations

The RT system can be configured with 1 through 16 megabytes of RAM. The amount of RAM your system requires depends on the number of system users, the number and size of licensed programs used, and the response time desired. As the number of users increases, you may want to increase RAM to maintain performance.

Program Name	Recommended RAM
AIX X-Windows	2M bytes
AIX/RT NFS	2M bytes
Applix IA	2M bytes
Architecture & Engineering Series	4M or 8M bytes (depending on display used)
BASIC Interpreter and Compiler	1M byte
CAEDS	8M bytes
CATIA	8M bytes
CIEDS	8M bytes
Common Lisp for the RT	4M bytes
Data Management Services	1M byte
Distributed Services	2M bytes
FORTRAN 77	1M byte
IBM Interleaf Publishing Series	6M bytes
IMSL	1M byte
INGRES	2M bytes
INmail/INnet/FTP	1M byte
NETWORK 3270-PLUS (SNA)	2M bytes
NETWORK 3270-PLUS (BSC)	1M byte
NETWORK RJE-PLUS (SNA)	2M bytes
NETWORK RJE-PLUS (BSC)	1M byte
ORACLE	2M bytes

Figure 1-1 (Part 1 of 2). Recommended Minimum RAM in a Single-User Environment

Program Name	Recommended RAM
Pascal	1M byte
Personal Computer AT Coprocessor Services (with the AT 512 KB Memory Expansion Option)	1M byte
Personal Computer AT Coprocessor Services (without the AT 512 KB Memory Expansion Option)	2M bytes
Personal Computer AT Simulator	4M bytes
Personal graPHIGS	1M byte
Professional Graphics Series	1M byte
PROFESSIONAL CADAM	4M bytes
RM/COBOL	1M byte
RT Publishing Software	2M bytes
SAMNA PLUS IV	1M byte
SOLOMON III	2M bytes
UNIRAS	1M byte
VS FORTRAN 77	2M bytes
VS Pascal	2M bytes
Workstation Host Interface Program	2M bytes
3278/79 Emulation	1M byte

Figure 1-1 (Part 2 of 2). Recommended Minimum RAM in a Single-User Environment

When you select software for use on the RT system, you should verify that your hardware devices will support it. In particular, be sure the display monitor you have is compatible with the software you intend to use.

Planning Ahead for Software Installation

Before you install the AIX Operating System, other AIX programs, or optionally available licensed programs, you should complete the planning worksheets included in this chapter. These worksheets are provided so that you can be reasonably sure that you have enough fixed-disk space to support the operating system and licensed programs you intend to use. Planning ahead for minidisk size requirements is much easier than making corrections if you should run out of space.

In order to plan for installation of the operating system and licensed programs, you may find the information on the following topics helpful:

- Code service
- RT minidisk types
- RT fixed-disk drive capacity.

These topics are discussed in the following sections.

If you completed the worksheets provided in the *Planning Guide* to plan for your software installation, take your completed worksheets and begin the installation process with "Loading the Installation/Maintenance Diskette" on page 4-7.

Code Service

Code service is a process where one or more server systems provide access through a distributed services network for client systems to the code and functions of AIX programs and licensed programs.

The server contains most of the data files or programs that the client reads; the client is dependent on a server to provide it with programs or access to programs. While most files are installed on the server, certain programs require program subsets to also be installed on the client.

The support programs that are required for code service consist of the Virtual Resource Manager, Base System Program, SNA Services, Distributed Services, and either IBM Token-Ring Network or baseband network device drivers.

Operating in an active code-service environment affects how you plan for minidisk size requirements. For an example of calculating disk space requirements in an active code-service environment, see page 1-30. For additional information on code service, see *Managing the AIX Operating System*.

Minidisk Types

The RT system requires that different parts of the system, various working files, and user data be placed on partitions of the fixed disk called *minidisks*. A minidisk is a variable-sized portion of contiguous space on a fixed disk. Minidisks consist of 512-byte segments called *blocks*. All references to minidisk size are expressed as number of blocks.

All the space on a fixed disk does not have to be included in a defined minidisk. Free space on a fixed disk can always be used for future expansion and to maintain flexibility.

Minidisks Defined by the System

During installation and configuration of a typical RT system, the system defines several minidisks for its basic software components and requirements. These system minidisks reside only on internal disks and include:

- **/vrn**

This minidisk contains the Virtual Resource Manager (VRM) code and is the first component installed.

- **Paging**

The VRM requires this minidisk to perform *paging*. Paging is the act of copying virtual memory into or out of the available real memory. The default paging minidisk sizes are determined by the fixed-disk configuration and the amount of random access memory. These defaults can be changed when the VRM is installed, if desired. The table on the next page shows the approximate default paging minidisk sizes.

Note: Some applications may require more paging space than the defaults shown in the following table.

	Random Access Memory Size – Megabytes (MB)								
Physical Disks	1 MB	2 MB	3 MB	4 MB	5 MB	6 MB	8 MB	12 MB	16 MB
40MB (1)	7580	9510	11440	13400	15334	17270	21141	28076	35602
40MB (2)	9750	12235	14720	17210	19695	22181	27152	36338	46078
40MB (3)	11025	13830	16640	19450	22267	25677	30698	41171	52206
70MB (1)	10000	11410	13730	16050	18366	20684	25320	34746	44060
70MB (2)	12265	14135	17010	19880	22752	25624	31367	43008	54536
70MB (3)	12535	15730	18925	22120	25315	28510	34900	47841	60665
114MB (1)	10663	13381	16099	18816	21534	24252	29688	40560	51432
114MB (2)	12835	16106	19378	22649	25921	29192	35736	48822	61908
114MB (3)	14105	17701	21296	24891	28487	32082	39273	53655	68036
310MB (1)	13797	17314	20831	24348	27865	31382	38416	52484	66552
310MB (2)	15969	20040	24111	28181	32252	36322	44464	60746	77028
310MB (3)	17240	21634	26030	30423	34818	39212	48001	65579	83156
70MB (1) 114MB (1)	12163	15263	18363	21464	24564	27664	33865	46266	58667
70MB (1) 114MB (1) 310MB (1)	15258	19147	23036	26925	30814	34703	42481	58038	73594
70MB (2) 114MB (1)	13173	16531	19889	23246	26604	29962	36678	50109	63540
70MB (1) 114MB (2)	13674	17159	20644	24130	27615	31101	38072	52013	65955
70MB (1) 310MB (1)	14435	18115	21795	25474	29154	32833	40192	54911	69629
70MB (1) 310MB (2)	16304	20460	24616	28772	32929	37085	45397	62021	78645
70MB (2) 310MB (1)	14965	18780	22594	26409	30224	34038	41667	56926	72184
114MB (1) 310MB (1)	14923	18727	22531	26335	30139	33942	41550	56766	71982
114MB (2) 310MB (1)	15525	19482	23439	27396	31354	35311	43226	59055	74884
114MB (1) 310MB (2)	16498	20704	24909	29115	33320	37525	45936	62758	79579

- **/ (root)**

The **/** minidisk, called the root minidisk, is the highest level file system of the AIX Operating System. This minidisk can also contain some of the system files and licensed program files, but should not be used for personal user files.

- **/usr**

The **/usr** minidisk is a file system that contains most of the licensed programs, as well as some system programs. Most of the **/usr** files in an active code-service environment will be installed on the server, not on the client. This affects the required size of the **/usr** minidisk for both the server and for the client. For additional information, see *Managing the AIX Operating System*.

- **/tmp**

The **/tmp** minidisk is a file system used for temporary files. If large files are archived, sorted, or edited, the size of the **/tmp** minidisk must be increased to accommodate these large files. IBM recommends that you allocate at least 3000 blocks for **/tmp**; some programming and development environments require more than 3000 blocks.

If you are acting as a server in an active code-service environment, IBM recommends that you allocate at least 35,000 blocks for your **/tmp** minidisk. This minidisk needs to be large enough to accommodate temporary space for code service program copies. For additional information, see *Managing the AIX Operating System*.

- **/u**

The **/u** minidisk is created for storage of user files. The amount of fixed-disk space to allow for **/u** depends on the number of users your system will be supporting and the licensed programs you plan to use.

- **Dump**

The dump minidisk contains operating system memory dumps. This information is helpful in case you experience problems or require diagnostic service at your site. If your system has only one 40-megabyte fixed disk, IBM recommends you allocate 3000 blocks for dump; all other systems should use 6000 blocks for dump. However, if you are running SNA Services and Distributed Services, it is recommended that you increase the size of your dump minidisk to 8000 blocks. If you are acting as a server in an active code-service environment, increase your dump minidisk to 10,000 blocks. For additional information, see *Managing the AIX Operating System*.

You can store user files on the `/`, `/tmp`, or `/usr` minidisk. However, if the operating system is ever reinstalled using the replace option rather than the merge option, these minidisks may be completely replaced, and user files lost. IBM recommends that you place user files only on the `/u` minidisk or on minidisks you define. See "Reinstalling the Base System Program" on page 4-35 for more information on reinstalling AIX.

Note that about 5 percent of the space is used for indexes, so the actual space available for data is about 95 percent of the total minidisk space.

Minidisks Defined by the User

You can define your own minidisks in addition to the default minidisks defined by the system. These user-defined minidisks can be used to store files, programs, or for any purpose you desire.

Some licensed programs, such as PROFESSIONAL CADAM, require that you define a separate minidisk for their files. For some large programs (Applix IA and SOLOMON III), IBM recommends that you define separate minidisks.

“Learning About Minidisks” on page 7-4 provides more information on user-defined minidisks, as well as the default locations of minidisks for systems with one, two, or three fixed disks.

Fixed-Disk Drive Data Capacity

You can have as many as 3 internal fixed disks and up to 28 external fixed disks on the RT system. Internal disks come in 70-, 114-, and 310-megabyte models while the external disks come in 200- and 400-megabyte models. Portable disk drive modules come in 70-, 114-, and 310-megabyte sizes. The capacity of the internal and external fixed disks, expressed as 512-byte blocks, is approximately:

- **Internal Disks and Portable Disk Drive Modules**

70-megabyte drive = 138,000 blocks

114-megabyte drive = 224,000 blocks

310-megabyte drive = 605,880 blocks

- **External Disks**

200-megabyte drive = 409,600 blocks

400-megabyte drive = 819,200 blocks

Using the Calculation Worksheets

The worksheets on the next pages are provided so you can figure the fixed-disk requirements for a given set of software components and plan for the placement of minidisks on the fixed disks. For an example of calculating disk space requirements for a single-user system, see page 1-26. For an example of calculating disk space requirements for an active code-service environment, see page 1-30.

Fill out the Minidisk Calculation Worksheet (Figure 1-4 on page 1-24) using the block sizes from Figure 1-2 on page 1-17 and Figure 1-3 on page 1-19. Additional space is provided on the worksheet along the top for minidisks you have defined and along the side for programs not listed in the tables.

The shaded areas in the Minidisk Calculation Worksheet (Figure 1-4 on page 1-24) indicate minidisk locations that are not valid or not recommended for specific types of data. The **Future Uses** row allows you to include an expansion factor for minidisk size, if desired.

The Disk Configuration Worksheet (Figure 1-5 on page 1-25) helps to verify that the number and size of fixed disks you have chosen will support your software.

If the total number of blocks exceeds the number of blocks available with your fixed-disk configuration, consider the following actions:

- Rearrange the minidisks in the following order to use the available disk space more efficiently:
 - The dump minidisk can be moved without affecting performance.
 - The **/u** or user-defined minidisks can be moved.
 - The **/tmp** minidisk can be moved.
 - If necessary, move either **/** (root) or **/usr**.
- Divide user data into several smaller minidisks to spread the data across multiple disks.
- Use a larger fixed disk or an additional disk drive instead of a 40-megabyte disk. Either of these actions will require that you change the paging space if default values are used.

After you have decided which programs to install, follow these steps to calculate fixed-disk requirements and plan for minidisk placement:

1. Make photocopies of Figure 1-2 on page 1-17, Figure 1-3 on page 1-19, Figure 1-4 on page 1-24, and Figure 1-5 on page 1-25, if needed. Fill out the copies, not the originals.
2. Find the operating system programs on the Base Operating System Disk Space Worksheet (Figure 1-2 on page 1-17) that you intend to use. Circle (or highlight in some way) the block size requirement values that correspond to the programs you have selected. On the Minidisk Calculation Worksheet, write the program name in one of the blank spaces in the **Program** row and indicate the required block sizes in the

appropriate minidisk columns. Add the operating system block requirements for each minidisk, and write this total on the **Totals-Operating System** row.

3. Find the licensed programs on the Licensed Program Disk Space Worksheet (Figure 1-3 on page 1-19) that you intend to use. Circle (or highlight in some way) the block size requirement values that correspond to the programs you have selected. On the Minidisk Calculation Worksheet, write the program name in one of the blank spaces in the **Program** row and indicate the required block sizes in the appropriate minidisk columns. Add the licensed program block requirements for each minidisk, and write this total on the **Totals-Licensed Programs** row.
4. If you plan to use a software program not listed in this publication, write the program name in one of the blank spaces in the **Program** row and indicate the required block sizes in the appropriate minidisk columns.
5. If you plan to define minidisks not listed, write the minidisk name in one of the blank spaces in the **Minidisk Requirements** row and indicate the required block sizes below.
6. To allow minidisk space for future expansion, write the block size requirements in the **Future Uses** row for the appropriate minidisks.
7. Write the total block size requirement for each minidisk (including dump, paging, and user-defined minidisks) in the **Totals** row.
8. Now fill out the Disk Configuration Worksheet with the results from the Minidisk Calculation Worksheet. Write the minidisk name and total number of blocks required in the spaces provided for systems with 1, 2, or 3 fixed disks. Be sure that you have enough disk space to support your planned software.

Minidisk Size Requirements

Figure 1-2 on page 1-17 shows the minidisk space requirements for operating system components. Figure 1-3 on page 1-19 shows the values for optionally available licensed programs. If you are a client in an active code-service environment and program subsets are installed, use the minidisk sizes indicated with an asterisk (*) to the right of the program name.

Multi-User Services and Extended Services, which consist of multiple diskettes included with the AIX Operating System, contain modules that can be installed separately. Installing only those you need will make space available for other uses. See Chapter 5, "Installing Additional Operating System Programs," for descriptions of each module and of other additional AIX Operating System programs. These descriptions may help you decide whether to install some or all of the programs. You should install only those that you think you will need.

Note: Block size requirement values provided in this publication for software components are accurate as of the date of this publication. Variations to the sizes provided may occur as a result of modifications to the software components made by the manufacturer. IBM is not responsible for variations made to these components after the date of this publication.

Program Name	Minidisk Requirements		
	/	/usr	/vrm
Asynchronous Terminal Emul.	50	560	0
Base System Program	22000	8800	0
Base PC Network Services	1380	390	0
DOS Server	0	1500	0
Exploring Usability Services	0	2250	0
Extended Services	0	100	0
Administrative Support	0	700	0
DOS Services	0	3000	0
Extended Programming Support	0	3100	0
Source Code Control System	0	1000	0
Text Support	15	2000	0
uucp, ct, cu Support	0	2000	0
uucp, ct, cu Support *	0	90	0
vi Editor	0	520	0
Games	0	700	0
Sendmail	6	750	0
Sendmail *	5	120	0
MH (Message Handling) Package	0	5300	0
INed	10	4200	0
Interface for use with TCP/IP	1500	4670	0
Interface for use with TCP/IP *	1425	175	0
Multi-User Services	0	100	0
Accounting Support	0	650	0
System Activity Recording	0	220	0
Inter-workstation Commands	0	100	0
Terminal Support	0	480	0
Advanced Display GSL	0	6500	0
Graphics Device Drivers	0	2400	0
Graphics and Statistics			
Commands	0	2500	0
HFT Examples Programs	0	2500	0
Sockets & BSD Portability Files	10	520	0
Subtotals, Part 1			

Figure 1-2 (Part 1 of 2). Base Operating System Disk Space Worksheet

Program Name	Minidisk Requirements		
	/	/usr	/vrn
SNA Services	3824	5492	0
Update to Operating System	1500	4000	0
Usability Services	90	3500	0
Virtual Resource Manager	0	0	3550
VRM Device Drivers	0	100	0
By Adapter Card Group:			
3278/79 Emulation Adapter	220	50	0
Baseband Adapter	370	50	0
Multiprotocol Adapter	520	100	0
SCSI Adapter	100	0	0
Token-Ring Adapter	475	950	0
By Components:			
3270 AIX DD	50	314	0
3278/79 DFT VRM DD	80	0	0
Baseband VRM DD	230	211	0
Block I/O AIX DD	90	275	0
IEEE Baseband DLC	350	0	0
MPDP VRM DD + Microcode	286	224	0
SCSI VRM DD	125	10	0
SDLC DLC	336	0	0
Standard Baseband DLC	360	0	0
Token-Ring DLC	355	0	0
Token-Ring Diagnostics DLC	5	907	0
Token-Ring VRM DD	246	211	0
Subtotals, Part 2			
Totals (Subtotals, Parts 1 and 2)			

Figure 1-2 (Part 2 of 2). Base Operating System Disk Space Worksheet

Program Name	Minidisk Requirements		
	/	/usr	Comments
Applix IA	0	36000	Separate minidisk recommended.
Architecture & Engineering Series	0	200	Requires 22,750 blocks in a separate minidisk in /usr/lpp/aes . Additional space required for symbol libraries and optional applications.
BASIC Interpreter and Compiler	0	4800	
CAEDS	0	24000	
Object Modeler	0	28000	
System Modeler	0	8000	
Graphics Finite Element Modeler	0	30000	
Integrated Finite Element Solver	0	22000	
Dimensioning	0	30000	
CATIA Version 3.1			
CATIA Base	0	0	Requires 90,000 blocks in /u or a separate minidisk in /u/catia .
CATIA Library	0	0	Requires 10,000 blocks in /u/catia or in a separate minidisk.
CATIA Drafting	0	0	Requires 40,000 blocks in /u/catia or in a separate minidisk.
CATIA 3D Design	0	0	Requires 65,000 blocks in /u/catia or in a separate minidisk.
CATIA Advanced Surfaces	0	0	Requires 15,000 blocks in /u/catia or in a separate minidisk.
CATIA Solids Geometry	0	0	Requires 30,000 blocks in /u/catia or in a separate minidisk.
CATIA Numerical Control - Mill	0	0	Requires 25,000 blocks in /u/catia or in a separate minidisk.
Subtotals, Part 1			

Figure 1-3 (Part 1 of 5). Licensed Program Disk Space Worksheet

Program Name	Minidisk Requirements		
	/	/usr	Comments
CATIA Server	0	0	Requires 15,000 blocks in a separate minidisk in /u/catia/server .
CATIA Version 2.2 CATIA Design System	0	0	Requires 100,000 blocks in a separate minidisk in /u/catia .
CATIA Advanced Surfaces	0	0	Requires 2,500 blocks in existing minidisk in /u/catia .
CIEDS Design Capture	0	0	Requires a separate 24,000-block minidisk in /sl .
Interfaces	0	0	Requires 6,000 additional blocks in /sl .
Engineering Access Routines	0	0	Requires 2,000 additional blocks in /sl .
Circuit Board Design System (CBDS)	0	0	Requires a separate 85,000-block minidisk in /CBDS .
Common Lisp Development Environment	0	36000	Separate minidisk recommended. Requires 48,000 blocks paging space for small programs and 64,000 blocks paging space for larger programs.
Application Environment	0	24000	
Data Management Services	0	3064	
Distributed Services	1200	2250	
FORTTRAN 77	4	1600	
Subtotals, Part 2			

Figure 1-3 (Part 2 of 5). Licensed Program Disk Space Worksheet

Program Name	Minidisk Requirements		
	/	/usr	Comments
IMSL Base	0	2000	/usr is the recommended minidisk.
MATH/PROTRAN		6700	
STAT/PROTRAN		11000	
LP/PROTRAN		4800	
MATH/LIBRARY		12000	The base is included in each of these three packages, but appears only once, no matter how many libraries are installed.
STAT/LIBRARY		10500	
SFUN/LIBRARY		700	
INGRES	0	0	Requires 34,000 blocks in a separate minidisk.
INmail/INnet/FTP	580	1350	
IBM Interleaf Publishing Series	0	50000	Requires 50,000 blocks with the 3812 Pageprinter or 100,000 blocks with the 4216 Personal Pageprinter; 140,000 blocks maximum to install program plus all options (does not include document storage).
NETWORK RJE-PLUS (BSC)	4	4350	
NETWORK RJE-PLUS (SNA)	4	4350	
NETWORK 3270-PLUS (BSC)	4	5200	
NETWORK 3270-PLUS (SNA)	4	5100	
AIX/RT NFS	2640	3000	
ORACLE	0	0	Requires 32,000 blocks in a separate minidisk.
Pascal	0	1696	
Personal Computer AT Simulator	180	3000	
Personal Computer AT Simulator *	180	50	
Personal Computer AT Coprocessor	660	480	
Personal graPHIGS	1087	4011	
Subtotals, Part 3			

Figure 1-3 (Part 3 of 5). Licensed Program Disk Space Worksheet

Program Name	Minidisk Requirements		
	/	/usr	Comments
PROFESSIONAL CADAM	50	50	30,000-block recommended paging size. Requires two separate minidisks: one 30,000-block minidisk in /CADAM, and one minidisk in CADAM/DRAWINGS.
Professional Graphics Series			
Graphics Development Toolkit	0	820	Graphics device drivers are part of AIX.
Graphics Terminal Emulator	0	480	
Plotting System	0	3720	
Graphical File System	0	1900	
RM/COBOL	0	550	Requires 1348 blocks in a separate directory to install.
RT Publishing Software	0	11000	/usr is the recommended minidisk.
SAMNA PLUS IV	0	7500	/usr is the recommended minidisk.
SOLOMON III	0	13050	Consider a separate minidisk.
General Ledger		2870	13050 blocks required once with any package.
Payroll		4240	
Accounts Payable		3030	
Accounts Receivable		2830	
Purchasing		1110	
Order/Entry Invoicing		1860	
Job Costing		2430	
Fixed Assets		1310	
Sales Analysis		1130	
Inventory		2420	
Address and Mail List		550	
Database Reporter		320	
Production Database		15960	Size can be 15960 to 136180 blocks.
Trial Database		720	
Log File		4300	Log File average - size will vary.
Subtotals, Part 4			

Figure 1-3 (Part 4 of 5). Licensed Program Disk Space Worksheet

Program Name	Minidisk Requirements		
	/	/usr	Comments
UNIRAS	0		BASE required once with any of these three packages.
BASE		3567	
DRIVERS		6604	
UNIGRAPH		3816	
UNIMAP		4128	BASE, DRIVERS, and FORTRAN 77 required once with any of these eight packages.
UNIEDIT		5136	
RASPAK SOLIDS		144	
BIZPAK		514	
GEOPAK		509	
KRIGPAK		255	
SEISPAK		240	
GEOINT		312	
GIMAGE		48	
RASPAK		1546	
VS FORTRAN	0	3900	
VS Pascal	0	3210	
Workstation Host Interface Program	432	6284	
AIX X-Windows			Requires more paging space than the default when used with a Megapel display.
X-Windows LPP	0	13100	
Metafonts only	0	4565	
X-Windows Samples	0	6620	
3278/79 Emulation	40	790	
Subtotals, Part 5			
Totals (Subtotals, Parts 1 through 5)			

Figure 1-3 (Part 5 of 5). Licensed Program Disk Space Worksheet

Disk ____		Disk ____		Disk ____	
Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks
TOTALS =					

Figure 1-5. Disk Configuration Worksheet

Remember, the approximate fixed-disk drive capacities in 512-byte blocks are:

- **Internal Disks and Portable Disk Drive Modules**

40M-byte drive = 86,000 blocks
 70M-byte drive = 138,000 blocks
 114M-byte drive = 224,000 blocks
 310M-byte drive = 605,880 blocks

- **External Disks**

200M-byte drive = 409,600 blocks
 400M-byte drive = 819,200 blocks

Example of Calculating Disk Space Requirements in a Single-User Environment

The user in this example is Mary. Mary is planning to install an RT system with one 70M-byte fixed disk and intends to use the following programs:

- Operating System
 - Virtual Resource Manager
 - Base System Program
 - INed
 - Extended Services (must be included if any Extended Services components are installed)
 - Extended Programming Support
 - Source Code Control System (SCCS)
 - Update to the Operating System.
- Licensed Programs
 - Personal Computer AT Coprocessor Services
 - BASIC Interpreter and Compiler
 - Pascal
 - Applix IA.

Mary will also allocate the following minidisk space:

- 35,000 blocks in `/u` for anticipated user files
- 11,410 blocks in the paging minidisk (2 Megabytes RAM)
- 6000 blocks in the dump minidisk
- 8000 blocks in a user-defined minidisk for the Coprocessor
- 15,000 blocks for free space
- Extra space in the following minidisks to allow for expansion:
 - `/usr` - 4000 blocks
 - `/` (root) - 1000 blocks
 - `/tmp` - 2500 blocks

Mary performs the following steps to complete the worksheets. For additional information, see "Using the Calculation Worksheets" on page 1-14.

1. Mary copies all the worksheets.
2. She then highlights the operating system and licensed programs that she plans to install (Figure 1-2 on page 1-17 and Figure 1-3 on page 1-19).
3. She writes the program names and block size requirements on the Minidisk Calculation Worksheet (Figure 1-6 on page 1-28) for the operating system programs and licensed programs listed previously.
4. Mary adds the block sizes for the operating system programs and writes this number in the **Totals-Operating System** row. She also adds the block sizes for the licensed programs and writes this number in the **Totals-Licensed Programs** row.
5. She indicates the space to allocate for the dump minidisk (6000 blocks), Coprocessor minidisk (8000 blocks), and free space (15,000 blocks).
6. She then adds the extra space as listed above to the **Future Uses** row for the **/usr**, **/** (root), and **/tmp** minidisks.
7. Mary adds the 35,000 blocks to the **User Files** row for the **/u** minidisk.
8. Mary looks at Figure 1-1 on page 1-6 to determine that 2 megabytes of RAM are recommended to support Applix IA on a single-user system. From the Default Paging Minidisk Sizes table on page 1-10, Mary sees that the default paging space for an IBM RT system with 2 megabytes of RAM and a 70-megabyte fixed disk is 11,410 blocks. She adds this number to the **paging** column.
9. She then adds the totals of each minidisk column to find the total minidisk requirement of 174,806 blocks. A 70-megabyte fixed disk, with a capacity of about 138,000 blocks, will not support this software configuration. Therefore, Mary chooses a system with two 70-megabyte fixed-disk drives. Two 70-megabyte disks will support about 276,000 blocks. For further information on fixed-disk drive capacity, see "Fixed-Disk Drive Data Capacity" on page 1-13.
10. Mary must now refer back to the Default Paging Minidisk Sizes table on page 1-10 to determine the default paging space for this new configuration. According to this table, an IBM RT system with 2 megabytes of RAM and two 70-megabyte fixed-disk drives requires 14,135 blocks of paging space.

PROGRAM	MINIDISK REQUIREMENTS										
	/	/usr	/var	/tmp	/u	dump	paging	COP	FREE		
<i>Operating System:</i>											
<i>VRM</i>	0	0	3550								
<i>Base System Program</i>	22,000	8800	0								
<i>Msd</i>	10	4200	0								
<i>Extended Services</i>	0	100	0								
<i>Extended Prog. Support</i>	0	3100	0								
<i>Source Code Control</i>	0	1000	0								
<i>Update to Operating System</i>	1500	4000	0								
<i>Licensed Programs:</i>											
<i>AT Coprocessor Services</i>	660	480	0								
<i>Basic</i>	0	4800	0								
<i>Pascal</i>	0	1696	0								
<i>Applix IA</i>	0	36,000	0								
User Files					35,000	6,000	11,410	8000	15,000		
Future Uses	1000	4000	3550	2500							
Totals-Operating System	23,510	21,200	0								
Totals-Licensed Programs	660	42,976									
TOTALS =	25,170	68,176	3550	2500	35,000	6,000	11,410	8000	15,000		

Total Minidisk 512-Byte Blocks = Total of the Line Above = 174,806

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Figure 1-6. Minidisk Calculation Worksheet

11. Mary now plans for placement of the minidisks on the two 70-megabyte fixed-disk drives. She writes the names of the minidisks and the number of blocks required on the Disk Configuration Worksheet, remembering that the default paging minidisk size has increased to 14,135 blocks. Mary also adds the number of blocks for each disk and enters these numbers in the **Totals** row.

Because the total number of blocks on each fixed disk is less than the capacity of a 70-megabyte drive (138,000 blocks), the configuration is valid. Mary also has at least 113,469 blocks of free space. When the time comes to actually install the system, this space can be left free for future expansion, added to the defined minidisks, or defined as separate minidisks.

Disk <u>1</u>		Disk <u>2</u>		Disk <u>3</u>	
Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks
/usr	68,176	/	25,170		
/vm	3,550	/tmp	2,500		
paging	14,135	/u	35,000		
		dump	6,000		
		cop	8,000		
Totals	85,861		76,670		

Figure 1-7. Disk Configuration Worksheet

Example of Calculating Disk Space Requirements in an Active Code-Service Environment

The example below shows how you can calculate disk space requirements for a server and a client in an active code-service environment. In this example, the client has one 70-megabyte fixed disk (approximately 138,000 blocks); the server has three 114-megabyte fixed disks (approximately 672,000 blocks). In an actual active code-service environment, more than one client system and possibly one or more additional servers could be installed.

If you are a client in an active code-service environment and program subsets are installed, use the minidisk sizes indicated with an asterisk (*) to the right of the program name.

The following tables show the support programs that are required for code service, *some* of the additional programs that are available, and the block sizes that need to be allocated for each minidisk on the server and on the client. The three VRM device drivers that are required for code service may be installed individually (as shown in the first table) or installed by baseband adapter card group.

The network administrator reserves space for the following:

Support Programs	Minidisk Requirements					
	Server			Client		
	/	/usr	/vrn	/	/usr	/vrn
Base System Program	22000	8800	0	22000	8800	0
Distributed Services	1200	2250	0	1200	2250	0
SNA Services	3824	5492	0	3824	5492	0
Virtual Resource Manager	0	0	3550	0	0	3550
VRM Device Drivers	0	100	0	0	100	0
Baseband VRM DD	230	211	0	230	211	0
Standard Baseband DLC	360	0	0	360	0	0
Block I/O AIX DD	90	275	0	90	275	0
Totals	27704	17128	3550	27704	17128	3550

	Minidisk Requirements					
	Server			Client		
	/	/usr	/vrm	/	/usr	/vrm
Additional Programs						
Data Management Services	0	3064	0	0	0	0
Extended Services	0	100	0	0	100	0
Administrative Support	0	700	0	0	0	0
DOS Services	0	3000	0	0	0	0
Extended Programming Support	0	3100	0	0	0	0
Source Code Control	0	1000	0	0	0	0
Text Support	15	2000	0	0	0	0
uucp, ct, cu Support *	0	2000	0	0	90	0
vi Editor	0	520	0	0	520	0
Games	0	700	0	0	0	0
Sendmail *	6	750	0	5	120	0
MH (Message Handling) package	0	5300	0	0	0	0
Total - Extended Services	21	19170	0	5	830	0
INed	10	4200	0	10	4200	0
Interface for use with TCP/IP *	1500	4670	0	1425	175	0
Multi-User Services	0	100	0	0	0	0
Accounting Support	0	650	0	0	0	0
System Activity Recording	0	220	0	0	0	0
Inter-workstation Commands	0	100	0	0	0	0
Terminal Support	0	480	0	0	0	0
Advanced Display GSL	0	6500	0	0	0	0
Graphics Device Drivers	0	2400	0	0	0	0
Graphics and Statistics						
Commands	0	2500	0	0	0	0
HFT Examples Programs	0	2500	0	0	0	0
Sockets & BSD Portability Files	110	520	0	0	0	0
Total - Multi-User Services	110	15970	0	0	0	0
Update to Operating System	1500	4000	0	1500	4000	0
AIX X-Windows	0	13100	0	0	0	0
3278/79 Emulation	40	790	0	40	790	0
Totals	3181	64964	0	2980	9995	0

INed, 3278/79 Emulation, and vi editor are examples of products that are installed locally on the client; they are always available, even if the client is not attached to the active service server. TCP/IP, uucp, and Sendmail are examples of products where program subsets are installed on the client.

The network administrator also allocates the following minidisk space:

	Server	Client
Dump minidisk	10000	8000
Paging minidisk (4-megabyte RAM)	22120	16050
/tmp minidisk	35000	3000
/u minidisk (space for user files)	40000	40000
/usr/lpp.install minidisk (space for program copies)	100000	
/usr/lpp.update minidisk (space for program copies)	30000	
Space for future expansion:		
/	10000	5000
/usr	35000	4000

The /tmp minidisk on the server must be large enough to accommodate temporary space for program copies of the largest program you plan to install. For example, Extended Services has approximately 19,170 blocks of data; the network administrator allocates 35,000 blocks for minidisk space for the /tmp minidisk.

The total minidisk block requirements for the two systems are:

	Server	Client
Support programs	48382	48382
Additional programs	68145	12975
Other minidisk requirements	282120	76050
Totals	398647	137407

The network administrator plans for the placement of the minidisks on the available fixed disks. Because the client has only one 70-megabyte fixed disk and the total minidisk block requirement is less than 138,000, all the client minidisks are assigned to this fixed disk. There are approximately 593 blocks available on the client. When the time comes to actually install the system, this space can be left free for future expansion, added to the defined minidisks, or defined as separate minidisks.

The following worksheet shows the names of the minidisks and the number of blocks allocated for each minidisk on the client:

Disk <u>1</u>		Disk <u> </u>		Disk <u> </u>	
Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks
<i>dump</i>	8000				
<i>paging</i>	16,050				
<i>/tmp</i>	3000				
<i>/u</i>	40,000				
<i>/</i>	35,684				
<i>/usr</i>	31,123				
<i>/var</i>	3550				
Totals	137,407				

Figure 1-8. Disk Configuration Worksheet - Client

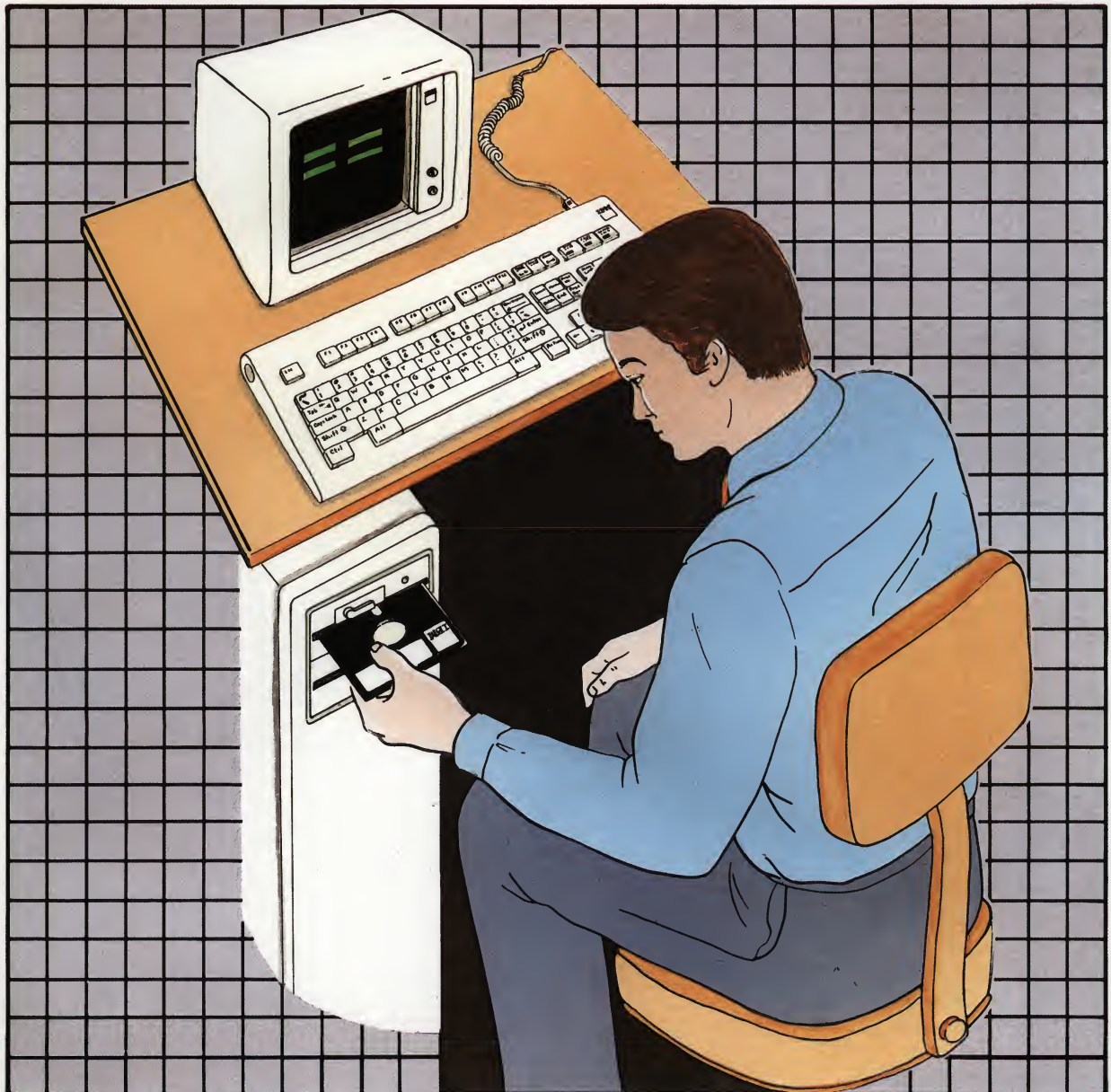
As shown on the following worksheet, the network administrator assigns the minidisks to the three 114-megabyte fixed disks on the server:

Disk <u>1</u>		Disk <u>2</u>		Disk <u>3</u>	
Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks	Minidisk Name	Number of Blocks
<i>/usr</i>	<i>117,092</i>	<i>/</i>	<i>40,885</i>	<i>/tmp</i>	<i>35,000</i>
<i>/var</i>	<i>3,550</i>	<i>/usr/lpp/install</i>	<i>100,000</i>	<i>/u</i>	<i>40,000</i>
<i>paging</i>	<i>22,120</i>			<i>/usr/lpp/update</i>	<i>30,000</i>
				<i>dump</i>	<i>10,000</i>
Totals	<i>142,762</i>		<i>140,885</i>		<i>115,000</i>

Figure 1-9. Disk Configuration Worksheet - Server

Because the total number of blocks on each fixed disk is less than the capacity for a 114-megabyte drive (224,000 blocks), the configuration is valid. There are approximately 273,353 blocks available on the server. When the time comes to actually install the system, this space can be left free for future expansion, added to the defined minidisks, or defined as separate minidisks.

Chapter 2. Getting Ready to Install the AIX Operating System



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About This Chapter

This chapter describes the following items as you prepare to install the AIX Operating System:

- The AIX Operating System and its functions in your IBM RT system
- The system keyboard and special keys that you will use to install programs
- Locating the keylock and power switch on the RT system
- Procedures for handling and for loading diskettes.

Introducing the AIX Operating System

After your IBM RT system components are unpacked, assembled, and running correctly, you must install the IBM RT AIX Operating System licensed program. The AIX Operating System manages system resources for you. It enables you to use several complex functions without having to know how those functions work. For instance, the AIX Operating System gives you access to system programs that handle processing, scheduling, storage, file systems, and printing for you. In addition, it accommodates several users at one time. It also enables those users to run several processes at one time.

The AIX Operating System contains these programs:

- Virtual Resource Manager Program (VRM)

The VRM provides various services, interfaces, and runtime routines, through which AIX controls the RT hardware and peripherals.

- Base System Program

The Base System Program diskettes contain the operating system kernel code. The Base System Program interprets a set of commands that perform a variety of tasks, including management of the AIX file system.

- Additional operating system programs

The additional operating system features provide a variety of options to extend the function and capabilities of your RT system. These optionally installable programs include an editor, support for additional device types, communications capabilities, and so on. Each of these features, along with installation instructions, is described in Chapter 5, "Installing Additional Operating System Programs."

Identifying Special Keys

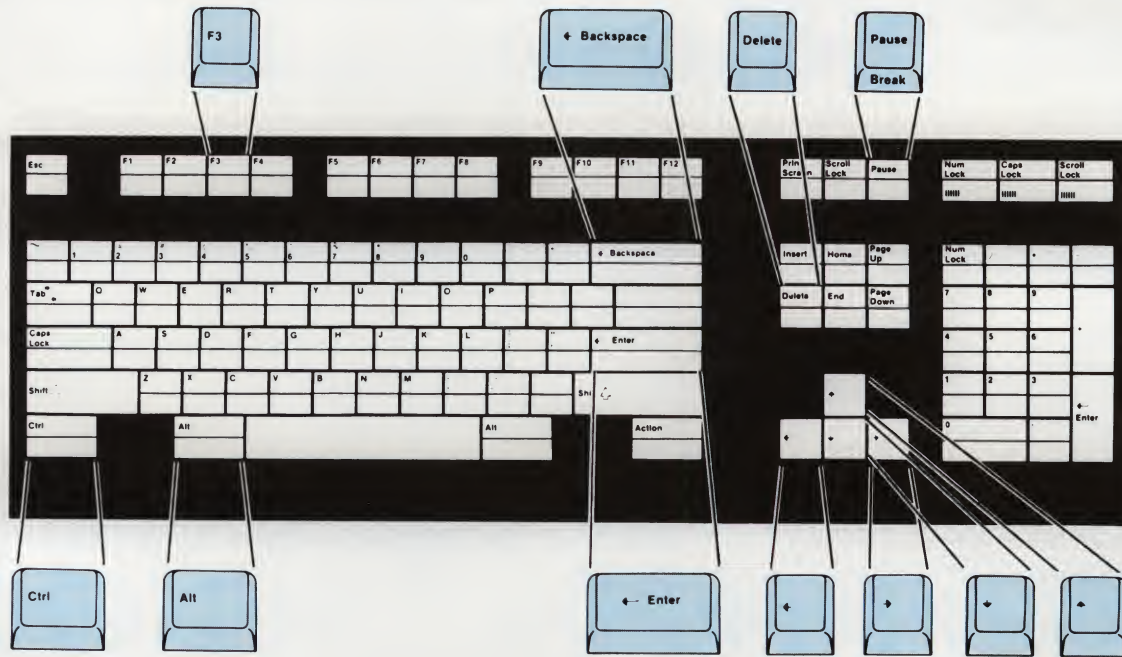
This section briefly describes specific keys that you use as you install the AIX Operating System.

Keyboard

To install the AIX Operating System, you must use the keyboard supplied with your IBM RT system.

The drawing on page 2-6 shows the 101-key Enhanced Personal Computer Keyboard that comes with the IBM RT 6150 System Unit or IBM RT 6151 System Unit. The highlighted keys are those keys you will use the most to install the AIX Operating System. See *Guide*

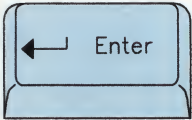
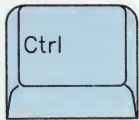
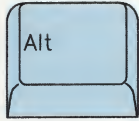
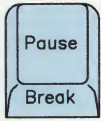

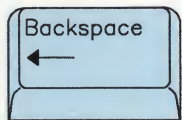

to Operations for a full description of the Enhanced Personal Computer Keyboard. See *Keyboard Description and Character Reference* for a description of the other available keyboards.

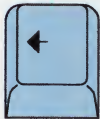
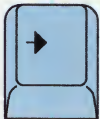




Keys

As you install the AIX Operating System, you will use the keys highlighted in the figure above. You will also use some of the keys in the typewriter keyboard area to enter information. You will not, however, use any of the keys in the numeric keypad on the right side of the keyboard.

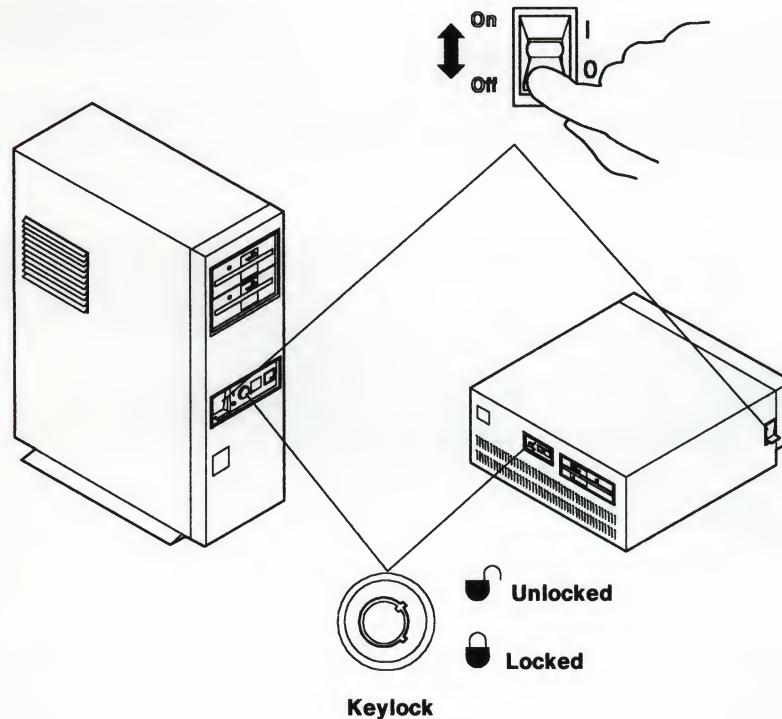
The keys you will use most often are described next. Locate them on your keyboard. If necessary, see *Guide to Operations* for a full description of all of the keys on your keyboard.

Engraving	Function	What It Does
	Enter	Enters information or commands into the RT system.
	Control	Works with other keys to perform various functions.
	Alternate	Works with other keys to perform various functions.
	Pause	Works in combination with the Alt and Ctrl keys to start or restart the system.
	Quit	Cancels a particular action.
	Backspace	Moves the cursor to the left and deletes characters.
	Delete	Erases the character where the cursor is positioned. When a character is deleted, all data to the right of the cursor moves left one position.

Engraving	Function	What It Does
	Cursor Left	Moves the cursor horizontally to the left across the screen.
	Cursor Right	Moves the cursor horizontally to the right across the screen.
	Cursor Up	Moves the cursor vertically up the screen or displays previous screen.
	Cursor Down	Moves the cursor vertically down the screen or displays new screen.

Locating the Keylock and the Power Switch

The figure below shows the location of the keylock and the power switch on your system unit:



A5A00009

Handling and Loading Diskettes

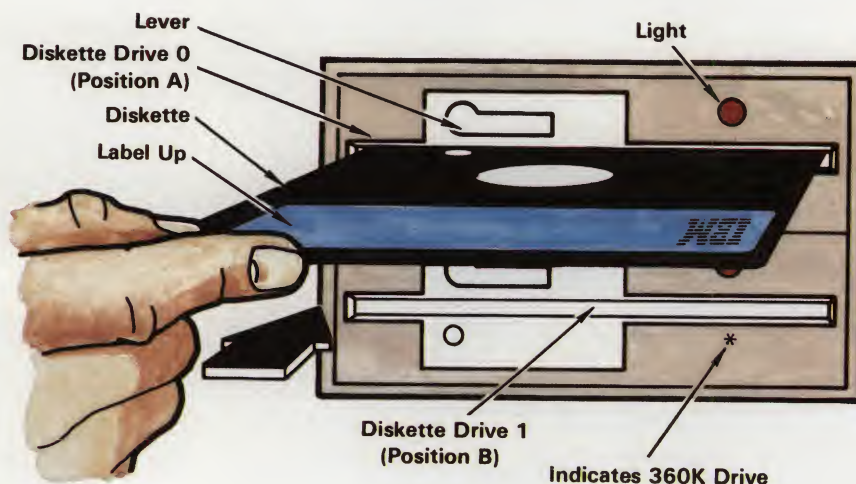
IBM diskettes are designed to stand up to normal and frequent handling. You should, however, handle them carefully to ensure reliable service.

Look carefully at the back of one of the paper envelopes containing your diskettes. The diagrams picture both correct and incorrect ways to handle diskettes.

Always return the diskette to the protective paper envelope when you remove the diskette from the diskette drive. Unprotected diskettes can be damaged easily. Although you can replace diskettes, you may not be able to replace the information on some diskettes.

If you have two diskette drives, at least one is a 1.2M-byte drive. If you are not sure which is the 1.2M-byte drive, use the top diskette drive. If both are 1.2M-byte drives, you can use either one. The only difference in appearance between the 1.2M-byte drive and the 360K-byte drive is a small star just below the light on the 360K-byte drive. The top drive is drive 0; the bottom drive is drive 1.

The correct way to insert the diskette into the diskette drive is shown in the following figure. To close the diskette drive, turn the lever clockwise.



Now that you are familiar with some of the RT features, you are ready to install the Virtual Resource Manager Program, which is the first step in installing the AIX Operating System.

Chapter 3. Installing the VRM Program



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Changing Only the Page Space Minidisk	3-21
Changing the Date and Time	3-23
Installing Updates to the Virtual Resource Manager	3-26
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About This Chapter

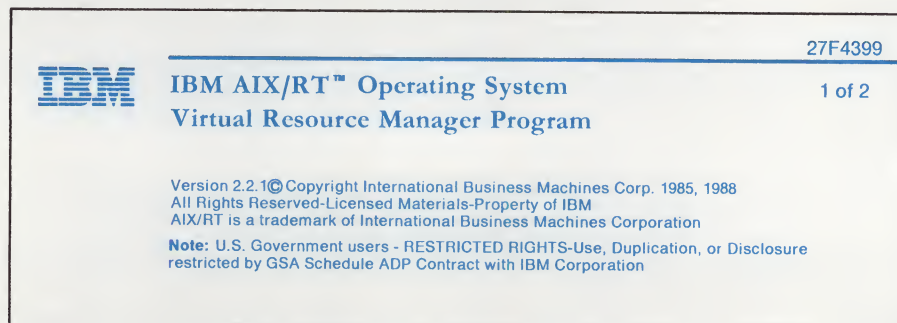
This chapter explains how to locate the VRM diskettes and install the VRM. The first step in this process is selecting the keyboard layout you want to use with the RT system. This chapter then describes three of the items you may select from the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu. These items are:

- Installing the VRM with current choices (defaults)
- Viewing the choices
- Changing the current choices and installing the VRM.

In addition, this chapter provides information about installing updates to the VRM or reinstalling the VRM.

Locating the VRM Diskettes

Locate the VRM diskettes in the diskette binder. You should have two VRM diskettes. The label on a VRM diskette will look similar to the one shown below:



A5A00021

Loading the VRM Diskettes

To load the VRM diskettes, follow these steps:

To Load VRM Diskettes

1. Open the door to diskette drive 0 (turn the lever counterclockwise). This is a 1.2M-byte drive and is always in the top position in your system. Insert the appropriate VRM diskette as shown on page 2-10. Close the drive door (turn the lever clockwise).
2. Turn the key in the keylock to the unlocked position (see the diagram on page 2-9).
3. Turn on the power switches to your system components (see the diagram on page 2-9).
4. Follow the prompts to install VRM. The system will tell you when (and in what sequence) to load these diskettes.

After you have inserted the diskette and turned on the system, the VRM programs are loaded into memory. You will know that the process is complete when you see the **VIRTUAL RESOURCE MANAGER INSTALLATION: KEYBOARD LAYOUT** menu on your display. The green power-on light (located on the system unit) indicates that the power supply is functioning correctly.

The system automatically runs a series of internal tests. You will see various numbers displayed on the two-digit display on your IBM RT system unit as the system runs the tests. If the system detects a serious problem, a number corresponding to the number of the test being run remains on the two-digit display. System operation stops at this point.

Nonblinking numbers indicate problems found by the hardware tests. Blinking numbers indicate that problems occurred during the initial loading of the system. See *Problem Determination Guide* for an explanation of the number displayed on the two-digit display. The same book also suggests the actions you may take to resolve the problem.

The first time you turn on the system, it will not run all the internal tests automatically unless the VRM diskette or the diagnostics diskette is in the diskette drive. But after you install the VRM, the system runs all the internal tests each time you turn on the power switch.

Notes:

1. If you see a message on the display *after* the system starts, see *Messages Reference*. There you may find suggestions about what caused the error, as well as how to correct it. Locate the explanation by finding the six-digit number corresponding to the number shown on your display.
2. If you see a flashing 45 on the two-digit display, see Appendix D, "Installing the VRM with Non-IBM RT Display," to install the VRM with a non-IBM RT display.

Understanding Your Choices

After the system runs the internal tests, you will see the VIRTUAL RESOURCE
MANAGER INSTALLATION: KEYBOARD LAYOUT menu similar to the one below:

VIRTUAL RESOURCE MANAGER INSTALLATION: KEYBOARD LAYOUT

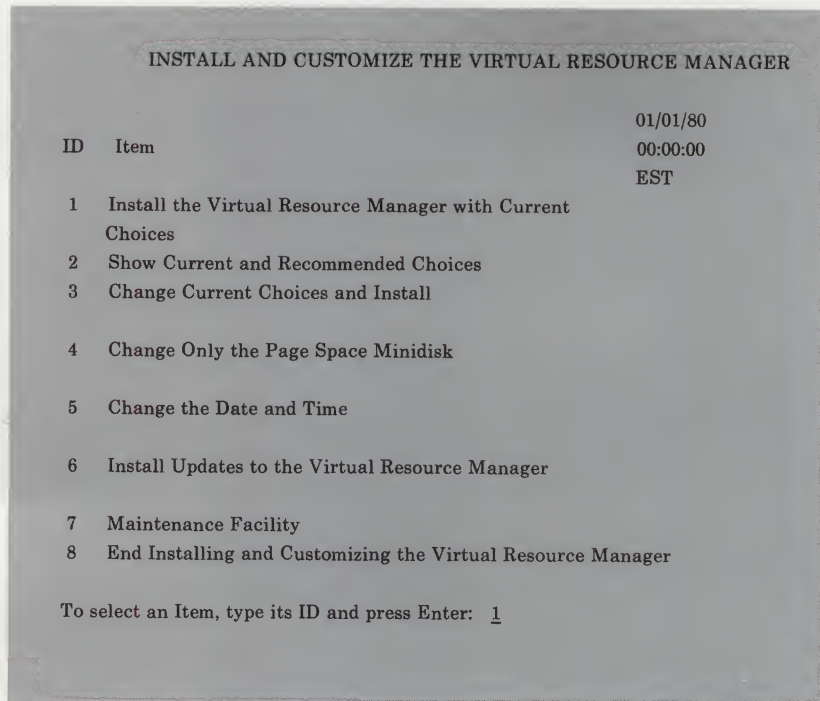
KEYBOARD

- United States English
- Belgian (French)
- Canadian (French)
- Danish
- Finnish / Swedish
- French
- German
- Italian
- Japanese
- Norwegian
- Portuguese
- Spanish
- Swiss (French)
- Swiss (German)
- United Kingdom English

To select a keyboard, use the Cursor Up and Cursor Down keys to move
the cursor to your keyboard name and press Enter.

IBM RT Virtual Resource Manager Version 2.2
(C) COPYRIGHT IBM CORP. 1985, 1988

After the keyboard is configured, you will see the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu on your display.



To choose an item from the menu, you type the ID number for the item you want. Then press **Enter**.

To accept the default ID number (located above the cursor), simply press **Enter**.

The installation procedures are menu-driven; that is, each time you choose an item, the system responds with a menu from which you make other choices or provide information. You always have the option of canceling the installation process and returning to the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu. You do so by pressing **F3 (Quit)**.

For more information about the options, see these pages:

- To select the keyboard layout you want to use with the VRM, see “Selecting the Keyboard for Use with the VRM” on page 3-10.
- To install the VRM with the defaults, see “Installing the VRM with Defaults” on page 3-11.
- To see the current choices, as well as recommended and possible choices, see “Viewing the Choices” on page 3-14.
- To change one or more choices and then install the VRM, see “Changing the Choices and Installing the VRM” on page 3-17. This section describes the choices that you can change. It also explains why you might want to make changes.
- To change only the choices for the page space minidisk, see “Changing Only the Page Space Minidisk” on page 3-21.
- To set or change the date and time, see “Changing the Date and Time” on page 3-23. If you select items 1, 2, or 3 and have not yet initialized the date and time clock, you will be asked to do so before completing the installation process.
- To install updates to the Virtual Resource Manager, see “Installing Updates to the Virtual Resource Manager” on page 3-26. After the VRM has been installed, use this option to install a VRM update diskette or to install a program that resides on the VRM minidisk (such as device driver information supplied by a manufacturer).
- To learn how to use the VRM Maintenance Facility, see *IBM RT Software Problem Determination Guide*. This facility should be used only by service personnel or experienced programmers.
- To leave the installation program, select item 8, “End Installing and Customizing the Virtual Resource Manager.” This option is not discussed in this book, but choosing item 8 gives you information on leaving the installation program.

Selecting the Keyboard for Use with the VRM

The RT system is used all over the world by people of diverse languages. All of the keyboard layouts have unique characters, punctuation, and symbols. For this reason, the RT system supports 15 different keyboard layouts.

The first step in installing the VRM is to choose the keyboard layout that includes the characters, punctuation marks, and symbols you intend to use. To select the keyboard layout to use with the VRM, complete the following steps:

To Select the Keyboard for Use with VRM

1. When the KEYBOARD LAYOUT menu is displayed, the cursor is located next to the United States English keyboard. If this is the keyboard you want to use, simply press **Enter**. If you want to select another keyboard, go to step 2.
2. Using the **Cursor Up** and **Cursor Down** keys, place the cursor next to the name of the keyboard you want to use. Be sure the cursor is on the same line as the keyboard you want to use, then press **Enter**.
3. The next menu verifies the keyboard you selected. If this is the keyboard you want to use, press **Enter**. If this is not the keyboard you want to use, press **Ctrl-Alt-Pause** to return to the keyboard list menu.

Note: If you decide to change your keyboard selection after the VRM is installed, you must reinstall the entire VRM. Also, anytime you load the VRM diskettes to change values, install updates, use the Maintenance Facility, and so on, the keyboard selection menu is displayed. You must select the keyboard each time you load the VRM diskettes so keystrokes will be processed correctly.

For more information on the characters, punctuation marks, and symbols supported by the various keyboard layouts, see *Keyboard Description and Character Reference*.

Installing the VRM with Defaults



Your VRM installation program comes equipped with IBM-supplied choices (defaults) for certain settings (these are always the defaults when you are installing the VRM for the first time). These choices are:

- The number of the fixed disk on which the VRM is stored
- The size in blocks that the VRM minidisk occupies
- The maximum number of files the VRM minidisk may contain
- The number of the fixed disk on which the page space minidisk resides
- The size in blocks that the page space minidisk occupies.

You may want to install the VRM with the recommended choices. If you plan to install your own programs on the VRM minidisk, you may need to enlarge the VRM minidisk. If you have several work stations, you may need to enlarge the page space minidisk. See Chapter 1, "Planning for Installation," and Appendix A, "Enlarging the VRM and Page Space Minidisks," for information about system defaults.

If you are installing the VRM for the first time, installing with the recommended choices should be simple. Choose the option that installs the VRM with the current choices because the current choices are the same as the recommended choices when no VRM minidisk exists. If you are reinstalling the VRM, the current choices are those in effect for the current VRM and page space minidisks.

To install the VRM with the IBM-recommended choices, complete the following steps:

To Install the VRM with Defaults

1. While the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu is displayed, press **Enter** to select item 1.

To select an item, type its ID and press Enter: 1

(When an ID number already is in place on a menu with the cursor at that position, you can simply press **Enter** to accept that choice.)

If you have not set the date and time, prompts will ask you to do so at this point.

2. A message tells you that the VRM is being installed. When installation is complete, a message tells you that the VRM has been installed. Remove the VRM diskette from the diskette drive and store the diskettes in a safe place.
3. If you have a VRM update diskette, you should install it now. See "Installing Updates to the Virtual Resource Manager" on page 3-26 for details.
4. You are now ready to install the rest of the AIX Operating System. See Chapter 4, "Installing the Base System Program."

Viewing the Choices



This section explains how you can see the choices currently in effect, as well as recommended choices and possible choices for the VRM minidisk and the page space minidisk. To see the choices, choose item 2 on the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu.

You may want to see the choices for these reasons:

- To change current choices
- To prepare to enlarge the VRM minidisk (for adding non-IBM programs)
- To prepare to enlarge the page space minidisk.

The SHOW CURRENT AND RECOMMENDED CHOICES menu lists the current, recommended, and possible choices for several items. For more information about these items, see "Changing the Choices and Installing the VRM" on page 3-17.

Follow these steps to see the current and recommended choices. Unless you have already made changes in a previous installation of the VRM, the current and recommended choices are the same.

If you have previously installed the VRM and made changes, the current choices (defaults) are those now in effect for the current VRM and page space minidisks.

To View Choices

1. On the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, type 2. Then press **Enter**.
2. After seeing the choices on the SHOW CURRENT AND RECOMMENDED CHOICES menu, choose one of these options:
 - To return to the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, press **F3 (Quit)**.
 - To install the VRM with the current choices, press **Enter**.

If you have not already set the date and time clock, prompts will ask you to do so at this point.
 - After installation is complete, remove the VRM diskette and store it in a safe place. Check to see whether you have a VRM update diskette. If so, you should install it now. See "Installing Updates to the Virtual Resource Manager" on page 3-26 for details.

The SHOW CURRENT AND RECOMMENDED CHOICES menu on your display screen should resemble the following:

SHOW CURRENT AND RECOMMENDED CHOICES			
	Current Choice	Recommended Choice	Possible Choices
Virtual Resource Manager			
Fixed Disk Number	0	0	0
Size in Blocks	3548	3548	3084 - 9012
Max Number of Files	128	128	128 - 320
Page Space Minidisk			
Fixed Disk Number	0	0	0
Size in Blocks	15952	15952	3508 - 138460
To cancel and go back to the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, press F8.			
To install the Virtual Resource Manager with the current choices, press Enter.			

Changing the Choices and Installing the VRM



This section explains how you can change choices for the VRM and page space minidisks and then install the VRM. To change choices, choose item 3 on the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu.

The items that you can change for the VRM minidisk and the page space minidisk are described on 3-17. After making the changes, you can install the VRM.

For each item that you can change, the display shows current, recommended, and possible choices. The current choices are those now in effect. Recommended choices may be suitable for many system users and are those sent with the VRM. (If you have not changed these choices, they are defaults for the items.) Possible choices show you the range of choices from which you may select as you make changes.

You can change choices for the following items:

- Fixed disk where the VRM will be stored

You can store the VRM on any internal fixed disk in your system (fixed disks 0, 1, or 2).

-
- Size in blocks for the VRM

If you want to add non-IBM code to the VRM minidisk, you may need to increase the size in blocks to have enough space to install the modules. A block consists of 512 bytes.

- Maximum number of files for the VRM

If you want to add non-IBM code to the VRM minidisk, you may want to increase the maximum number of files. The value for the maximum number of files really represents the maximum number of indexes that can be contained in the file system. The actual number for the maximum number of files is a multiple of the block size of a file system block (2048 bytes) divided by the size of the file index (64 bytes). The maximum number of files that can be contained on the VRM minidisk may often be larger than the number you enter, but it should never be smaller.

- Fixed disk where the page space will be located

The page space is an area on the fixed disk that temporarily stores instructions or data currently being executed. You may want to change the number of the fixed disk on which the page space minidisk resides. You can put the page space minidisk on any fixed disk in your system. See Appendix A, "Enlarging the VRM and Page Space Minidisks," for information about positioning the page space minidisk on the fixed disk.

- Size in blocks for the page space.

Usually, the more applications you run concurrently, the larger the page space should be. Knowing the requirements of your applications should help you determine approximate size requirements.

To Change Choices and Install the VRM

1. On the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, type **3**. Then press **Enter**.

If you have not set the date and time clock, prompts ask you to do so at this point.

2. On the CHANGE CURRENT CHOICES AND INSTALL screens, type the new choice for each item you see on each of the five screens. Then press **Enter**. If an item is acceptable and you do not want to change it, press **Enter** to go to the next screen. To cancel the changes, press **F3** to return to the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu and begin the sequence again.
3. A screen summarizing your choices appears so you can check your choices.

This screen is similar in format to the SHOW CURRENT AND RECOMMENDED CHOICES screen on page 3-16. If the choices under the "Current Choices" column are acceptable, press **Enter** to install the VRM.

Note: If you should receive a warning regarding the placement of the VRM minidisk and the page space minidisk, or both, turn to "Procedures for Enlarging a Minidisk" on page A-3 for more information.

4. After installation is complete, remove the VRM diskette and store it in a safe place. Check to see whether you have a VRM update diskette. If so, you should install it now. See "Installing Updates to the Virtual Resource Manager" on page 3-26 for details.

After installing the VRM program, you are ready to do one of the following:

- To install the rest of the AIX Operating System, see Chapter 4, “Installing the Base System Program.”
- If the rest of the operating system is already installed, press **Ctrl-Alt-Pause** to restart the system.

Note: If a message indicates that the installation process was not successful, see *Messages Reference* for details.

Changing Only the Page Space Minidisk



To change the size or location of the page space minidisk without having to reinstall the VRM, choose item 4 from the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu.

You can change both the number of the fixed disk on which you want the page space minidisk and the size in blocks. After you select item 4, make your changes. Then verify that you want the changes shown on the summary screen. The screens on which you make changes and the summary screen are similar in format to the SHOW CURRENT AND RECOMMENDED CHOICES screen on page 3-16.

Follow these steps to change the page space minidisk:

To Change Only the Page Space Minidisk

1. On the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, type 4. Then press **Enter** to go to the first CHANGE ONLY THE PAGE SPACE MINIDISK screen. For information on the choices for the page space minidisk, see "Changing the Choices and Installing the VRM" on page 3-17.
2. Type your new choice for the number of the fixed disk on which you want the page space minidisk. Then press **Enter**.
3. On the second screen, type your new choice for the size in blocks. Then press **Enter**.
4. Verify that the choices on the summary screen are the ones that you want. Press **Enter** to create the page space minidisk with the current choices.

When installation is complete, remove the VRM diskette. Press **Ctrl-Alt-Pause** to restart the system.

Changing the Date and Time



To have the current date and time on your display, you must set the date and time. You should have to set it only once unless you have to change the battery for the battery-powered clock in your system.

To set the date and time, select item 5 from the **INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER** menu. Then do the steps on the next page.

The current date and time for your system will display in the upper right portion of the **INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER** menu. (Note that the time is not updated constantly, but it shows the correct time when the screen first displays.) For your first installation, when the date and time clock has not yet been initialized, a default date and time appear.

Even if you do not choose item 5 to change the date and time, you will be asked to set the date and time clock during any of the installation options, when the clock is not yet initialized. In the future, you can choose item 5 to change the date and time.

To Change the Date and Time

1. On the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, type **5**. Then press **Enter**.
2. On the first CHANGE THE DATE AND TIME screen, enter the new date in the correct date format (**MMDDYY**). Then press **Enter**.
3. On the next screen, type the number corresponding to the time zone in which you live. Then press **Enter**.
4. On the next screen, type the current time in the correct time format (**HHMMSSd**). Then press **Enter**.

The screens you see as you change the date and time ask you to do the following:

1. Enter the date

The date format is MMDDYY.

MM is the number of the month.

DD is the day.

YY is the year.

2. Indicate the time zone

You enter a number from 1 to 24 to indicate the time zone you want to use. Note that there is no provision for entering a time difference that includes a partial hour. On the CHANGE THE DATE AND TIME menu are areas of the world associated with the time zone number. Also, the time difference from Greenwich mean time is shown.

3. Enter the time.

The time format is HHMMSSd.

HH is the hour in the 24-hour clock.

MM is the minutes.

SS is the seconds.

d is Y if Daylight Savings Time is currently in use
in your time zone.

is N if Daylight Savings Time is not currently in
use in your time zone.

Installing Updates to the Virtual Resource Manager



By selecting item 6 from the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, you can:

- Install a VRM update diskette
- Install a program supplied by a manufacturer for installation on the VRM minidisk.

Notes:

1. You must use the **shutdown** command to shut down the system before you install an update or other program on the VRM minidisk. Then you must insert one of the VRM diskettes and press **Ctrl-Alt-Pause**.
2. Some non-IBM RT components require that you follow the steps described in Appendix D, "Installing the VRM with Non-IBM RT Display," to install the VRM and any device driver information.

To Install Updates to the VRM

1. Use the **shutdown** command to shut down the system. Then insert one of the VRM diskettes and press **Ctrl-Alt-Pause**.
2. On the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu, type **6**. Then press **Enter**.
3. On the INSTALL UPDATES TO THE VIRTUAL RESOURCE MANAGER menu, follow the prompt to insert the program or update diskette. Then press **Enter**.
4. When the updates from the diskette have been installed successfully, the system prompts you to insert another update diskette if you have another to install. If you insert another one, press **Enter**. Otherwise, press **F3**.
5. When installation of updates is complete, follow the prompts to start the operating system or to return to the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu.

The system temporarily saves a copy of the VRM minidisk when the update process begins. Then, should an error occur during the update process, the copy is restored to the VRM minidisk so that the fixed disk still contains the VRM. For additional information on error messages, see *Messages Reference*.

Reinstalling the VRM

You may need to reinstall the VRM as a result of new VRM releases provided by IBM or for other reasons.

If you are installing a new VRM provided by IBM, the recommended size in blocks of the new VRM may be different from the old VRM. You should attempt to install the new VRM and paging minidisk with option 1 (Install the Virtual Resource Manager with Current Choices) from the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu. If there is not enough fixed-disk space for the VRM or paging minidisk, a message will inform you of that.

If there is not enough space for the VRM or paging minidisk, select option 3 (Change Current Choices and Install) from the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu. Perform the following procedures until the VRM and paging minidisk are successfully installed:

- If you have multiple fixed disks, select another disk for the VRM or paging minidisk. Although performance may be enhanced by placing the VRM and paging minidisk next to each other on the same fixed disk, you may not have enough space for both minidisks on the same fixed disk.
- Reduce the size of either the VRM or paging minidisk and install.
- Use the VRM Maintenance Facility commands described in *Software Problem Determination Guide*. Maintenance commands are available to determine the available space on a fixed disk, create or delete minidisks, and so on.

If you still cannot install the VRM and paging minidisk, you may have to back up the contents of the fixed disk that contains the VRM and paging minidisks and delete all the other minidisks on that disk. After backing up and deleting the existing minidisks, your fixed disk has only the VRM and paging minidisk loaded on it. Reinstall the VRM and paging minidisks with the current choices, then load your other files and data on the available fixed-disk space. Appendix A, "Enlarging the VRM and Page Space Minidisks," describes this procedure.

Another message you may see while reinstalling the VRM relates to the level of the VRM. For instance, if you are installing the same version (or an older one) as you already have in your system, a message will inform you of that. You can then decide whether to continue reinstalling.

Keep in mind that if you have installed additional programs on the VRM minidisk, these programs will be lost when you install new VRM releases provided by IBM. Therefore, reinstalling the VRM may require that you reinstall these programs. If so, while you are reinstalling the VRM, a list will display to show the programs you should reinstall.

If you are reinstalling the VRM with a backup copy you created with the `cvid` command, you may not need to reinstall these programs. You can compare the history files on your system against those on the backup diskette for information.

The history file contains a record for each program that has modified the VRM minidisk. If you are using a backup diskette created with the **cvid** command and want to check its history information, follow the steps in this example:

1. Insert one of the VRM diskettes in drive 0.
2. Type `mount /diskette0` and press **Enter**.
3. Type `cat /diskette0/lpp/vrm/lpp.hist` and press **Enter**.
4. Type `umount /diskette0` and press **Enter**.

See *AIX Operating System Commands Reference* for more information on **cvid**.

Chapter 4. Installing the Base System Program



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About This Chapter

This chapter explains these items:

- How to install or reinstall the Base System Program
- How to view and change defaults
- How to log in and log off.

Previewing Your Installation Options

The installation process described in this chapter establishes minidisks for the Base System Program and additional operating system programs. The installation process has the following user-selectable options:

- **Installing the Installation/Maintenance programs with defaults**

The programs on the Installation/Maintenance diskette come equipped with IBM-supplied defaults. You probably will want to install these programs and the others in the Base System Program and use them for a while before deciding whether you want to change the defaults. Factors that can help you decide to change the defaults include: the number of people using your system, the number of programs you install, the storage size required for those programs, and similar concerns.

- **Viewing the current choices**

The current choices for the disk number, location on the fixed disk, size in blocks, and maximum number of files on your AIX Operating System minidisks have been supplied by IBM. You can see the current choices as well as the recommended choices. Unless you have already installed the Base System Program and made changes, both current and recommended choices are the same. You also can see the range of possible choices.

- **Changing choices and installing the operating system**

When necessary, you can change the IBM-supplied defaults and then install the operating system. If you are reinstalling the Base System Program or using the procedures in Appendix A to enlarge a minidisk (when there is not enough free space to do so), you must back up some of your data. Before reinstalling, see "Reinstalling the Base System Program" on page 4-35.

Customizing Your System

Planning minidisk space requirements, as you have already done, is an important part of customizing your system. As you install the operating system, you have further opportunities to tailor the system for your needs.

As you install the Base System Program, the system automatically configures your system with the basic hardware components (system unit, display, keyboard). But as you add other hardware components (a printer, for example) and users to your system, and as you change the defaults, you customize your system. Chapter 6, "Customizing System Devices," and Chapter 7, "Customizing System Minidisks," help you customize your system.

When you customize your system, you describe (to the system) the devices, programs, and users for a particular data processing system. You have the options of using IBM-supplied defaults or of tailoring information about minidisks, devices, programs, users, and system values to suit your own needs. You can customize your system as you install the Base System Program or any time thereafter.

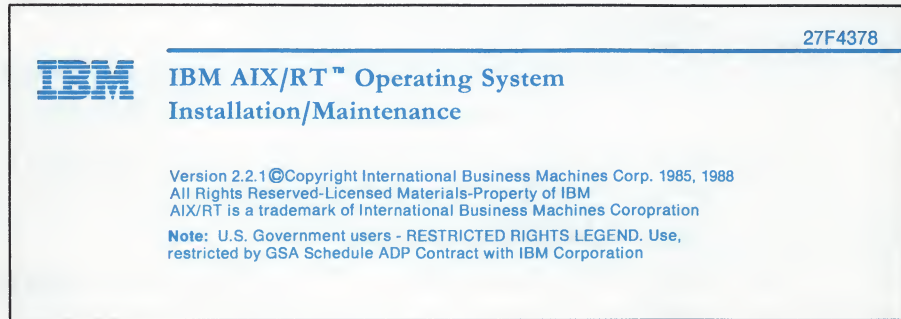
You use two basic commands to customize your system: **devices** and **minidisks**.

1. With **devices**, you can add predefined devices to your system, delete devices already attached to your system, and display or change device information describing your system. Chapter 6, "Customizing System Devices," explains how to use the **devices** command.
2. With **minidisks**, you can add minidisks to your fixed disk. You also can delete minidisks from your fixed disk or change the choices for minidisk characteristics. Chapter 7, "Customizing System Minidisks," explains how to use the **minidisks** command.

Another command that you can use to customize your system is the **users** command described in *Managing the AIX Operating System* and *AIX Operating System Commands Reference*. With **users**, you can add system users to or delete them from the system, invalidate or validate user passwords, and display or change information about system users.

Loading the Installation/Maintenance Diskette

Locate the Installation/Maintenance diskette and the diskettes containing the AIX Operating System file systems. The label of the Installation/Maintenance diskette is similar to the one shown below:



A5A31006

To begin the installation procedure, complete the following instructions to load the Installation/Maintenance diskette:

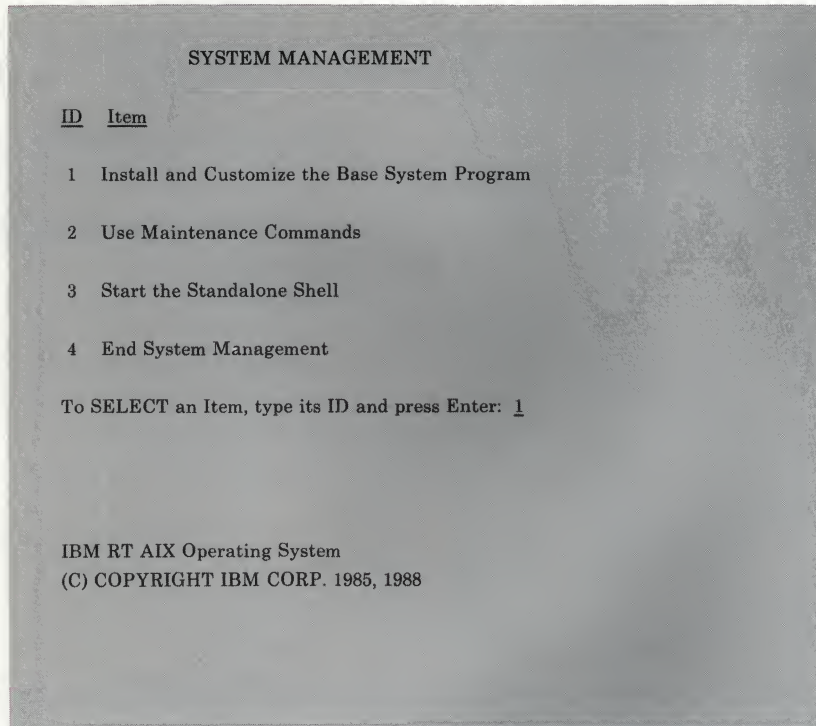
To Load the Installation/Maintenance Diskette

- If the system is running,
 1. Insert the Installation/Maintenance diskette into the top diskette drive, and turn the lever into the locked position.
 2. Press **Ctrl-Alt-Pause** to load the programs from the diskette into memory.
- If the system is not running,
 1. Insert the Installation/Maintenance diskette into the top diskette drive, and turn the lever into the locked position.
 2. Turn the key to the unlocked position.
 3. Turn on the power switches. The programs from the diskette will load into memory.

Note: If you see an error message on the display after the system starts, see *Messages Reference*. Locate the message by finding the six-digit number corresponding to the number shown on your display. Then read about what caused the message to appear and about what you can do to resolve the problem.

Understanding Your Choices

After the system loads the programs, you will see the SYSTEM MANAGEMENT menu.



The SYSTEM MANAGEMENT menu lists four options from which you can choose:

1. **Install and Customize the Base System Program.** This option takes you to one of two installation menus, depending on whether you are installing the Base System Program for the first time or reinstalling the operating system. If you are installing the Base System Program for the first time, this option takes you to the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu. "Installing the Base System Program with Defaults" on page 4-12 describes this option.

By following the prompts from this menu, you can do these steps:

- Install the Base System Program with current choices
- Show current and recommended choices
- Change current choices and install Base System Program.

If you are reinstalling the Base System Program, this option takes you to the **INSTALL NEW VERSION OF THE BASE SYSTEM** menu. By following the prompts from this menu, you can do these steps:

- Merge your existing Base System Program files with the new version of the Base System Program files. "Merging the Base System Program with a New Version" on page 4-36 describes this option.
 - Install the new version of the operating system over your existing version. "Replacing the Base System Program with a New Version" on page 4-39 describes this option.
2. **Use Maintenance Commands.** Choosing this option provides you with several maintenance tools. These tools are especially useful if you have system problems. If your fixed disk and files are not usable because of system failure or some other problem, you can start up your system with the Installation/Maintenance diskette. When you do so, you can use any of these maintenance tools:
- Show fixed-disk minidisk information
 - Change load status of a fixed-disk minidisk
 - Create a fixed-disk minidisk
 - Delete a fixed-disk minidisk
 - Check a file system
 - Make a file system
 - Format a diskette
 - Restore commands
 - Restore a file system
 - Restore a minidisk image from tape
 - Backup commands
 - Back up a file system
 - Back up a minidisk image to tape.

For information on using these commands, see *Managing the AIX Operating System*.

3. **Start the Standalone Shell.** Choosing this option starts the standalone shell from which you can issue any of the commands contained on the Installation/Maintenance diskette. See *Managing the AIX Operating System* for a list of those commands.
4. **End System Management.** This option allows you to choose the method of running the AIX Operating System. The choices are:
- Item 1 - Normal startup
 - Item 2 - Maintenance startup.

Selecting an Installation Option

After you have loaded the Installation/Maintenance diskette, you are ready to install the Base System Program. You should have the SYSTEM MANAGEMENT menu on your display.

If you have the Base System Program installed on your RT system, the Installation/Maintenance programs automatically take you to the INSTALL NEW VERSION OF THE BASE SYSTEM menu when you select option 1 (Install and Customize AIX). See "Reinstalling the Base System Program" on page 4-35.

If you are installing the Base System Program for the first time, continue with the next sections.

Using your planning worksheets as a guide, decide whether you want to install the Base System Program using system defaults or whether you want to change the system defaults to better meet the requirements from your worksheets.

Select from these options:

- To install the Base System Program with system defaults, continue on the next page.
- To view the system defaults, see "Viewing the Current Choices" on page 4-25.
- To override the defaults and make changes, see "Changing Choices and Installing the Base System Program" on page 4-30.

Note: If you have to install several RT systems at once and configure them in similar ways, you may want to create an Install/Maintenance diskette, which requires little input. For information on the automatic installation procedure, see *Managing the AIX Operating System*.

Installing the Base System Program with Defaults



To install the Base System Program with defaults, choose item 1. The defaults include:

- The number of the fixed disk where each of the AIX Operating System minidisks will be stored.
- The size in blocks for the AIX Operating System minidisks.
- The maximum number of files for the AIX Operating System minidisks.

Note: To see these choices before you install the Base System Program, turn to “Viewing the Current Choices” on page 4-25. After seeing the current choices, you can install from that menu or return to the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu.

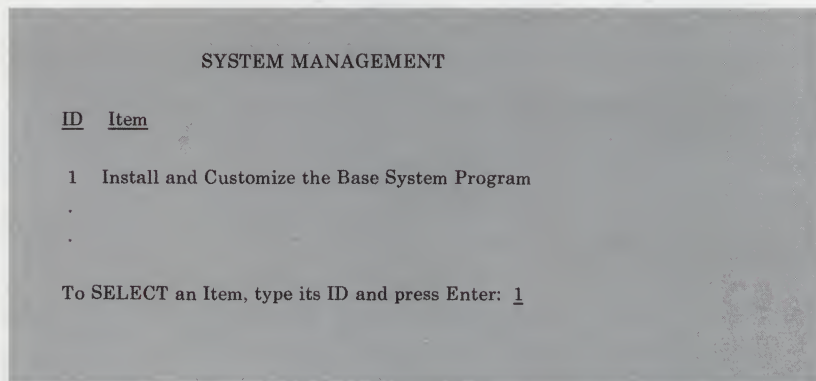
To install the Base System Program, along with the recommended choices for the previously listed items, perform the following steps:

To Install the Base System Program

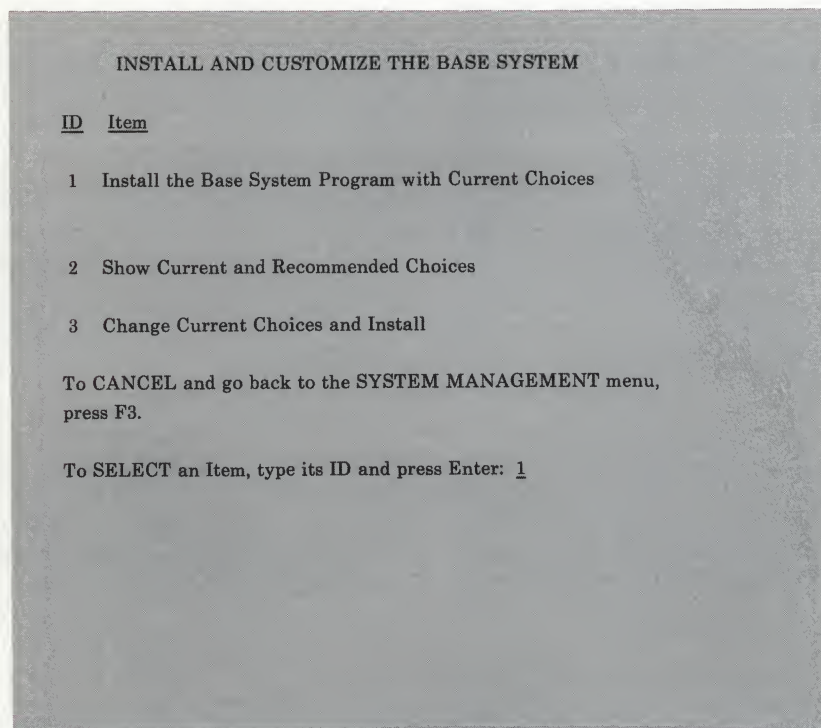
1. On the SYSTEM MANAGEMENT menu, press **Enter** to select the Install option.
2. On the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu, press **Enter** to choose the Install with Current Choices option.
3. Follow instructions to add the name you will use to log in to the system.
4. On the next screen, choose whether you want the system to ask for the user name and password.
5. Choose the input device from which you want to install the operating system. Then press **Enter**. If you are installing from tape, disregard the following steps about diskettes.
6. Press **Enter** to proceed with installation. Follow the prompts to load the Base System Program diskettes into diskette drive 0.
7. Insert all the diskettes until the entire Base System Program is installed.
8. When the Base System Program is installed, press **Enter** to continue with post-installation processing. When post-installation processing is completed, press **Enter** to return to the SYSTEM MANAGEMENT menu. Select item 4, "End System Management," and choose a method of running your system.
9. Read the rest of this chapter, beginning with "Logging In to the AIX Operating System" on page 4-40.
10. If you want to install any of the additional operating system programs described in Chapter 5, "Installing Additional Operating System Programs," do it now with the **installp** command. If your diskette binder includes an operating system update diskette, install it with the **updatep** command after the operating system and any additional programs are installed.

More Detailed Information

1. On the SYSTEM MANAGEMENT menu, press **Enter** to select the Install option. When a number is already in the column where you type choices, you can press **Enter** to select that number. The Install option provides you with these choices:
 - Install the Base System Program with current choices. If you have not installed the Base System Program before, the current choices are IBM-recommended defaults. If you have installed it before, the choices identified as current choices are those now in effect.
 - Show current and recommended choices. Unless you have already installed the Base System Program with changes, the current and recommended choices are the same.
 - Change current choices and install. You can change the current choices and then install the Base System Program.



-
2. On the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu, press **Enter** to go to the next screen.



-
3. Follow instructions to add the name you will use to log in to the system.

INSTALL AND CUSTOMIZE THE BASE SYSTEM

This step creates the name that you will use to log in to the system.

You may use up to 8 characters for this name.

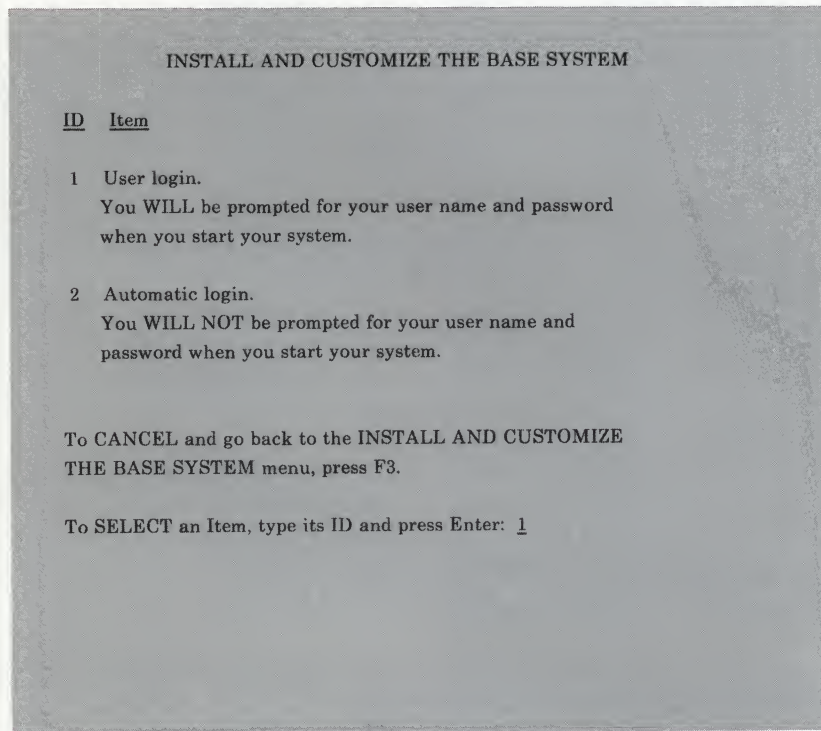
Use all lowercase characters for the name.

To CANCEL and go back to the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu, press F3.

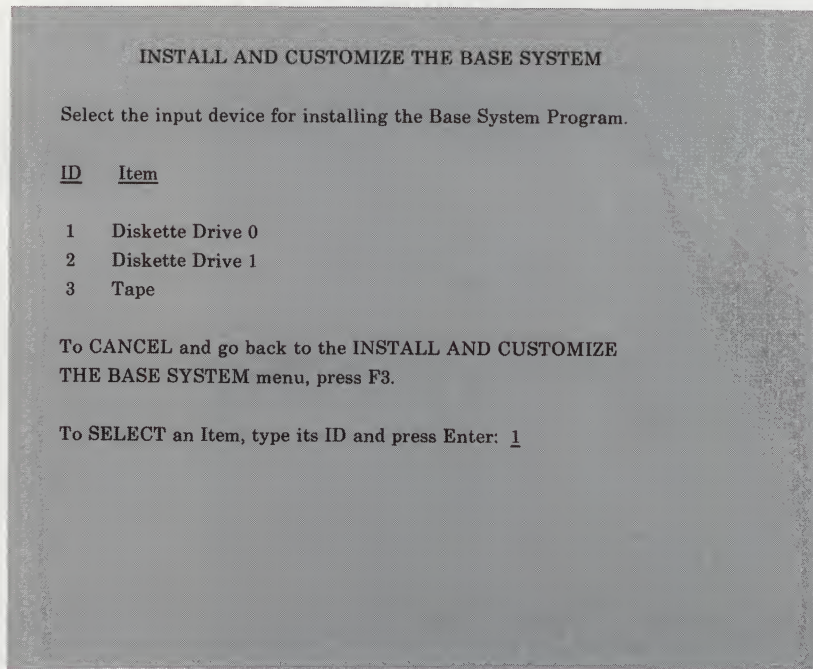
To CREATE your user name, type the name and press Enter:

Only one user on your system can use the autolog function. The user must be using the system console. Any user name that you specify in response to the autolog prompt automatically becomes a member of the system group. See *Managing the AIX Operating System* for a discussion of different classes of users. Members of the system group have privileges that many other users do not. You can, of course, choose to have the system request your user name and login for security purposes.

-
4. On the next screen, choose whether you want the system to request the user name and password. For more information on passwords and on security concerns, see *Managing the AIX Operating System*. Maintaining strict security is always important, especially if several people will be using your system.



-
5. Choose whether you want to install the Base System Program from diskette drive 0, diskette drive 1, or tape. Type the number for your choice. Then press **Enter**.



Note: If you plan to use tape to load programs on client machines, refer to *Managing the AIX Operating System* for details.

To work properly, diskette drive 1 (item 2) must be a 1.2-megabyte drive.

-
6. Indicate whether you want to proceed with the installation process or cancel and return to the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu. To proceed, remove the Installation/Maintenance diskette. Then press **Enter**.

INSTALL AND CUSTOMIZE THE BASE SYSTEM

Installation of the Base System Program will take several minutes.

To **CANCEL**, and go back to the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu, press **F3**.

To **INSTALL** the Base System Program, remove the Installation/Maintenance diskette from diskette drive 0, and press **Enter**.

To prepare for installation, the system proceeds to make file systems on the default minidisks (**/**, **/usr**, **/tmp**).

-
7. Follow the prompts to insert the appropriate Base System Program diskette into the diskette drive. Note that the word `volume` means diskette and that `/dev/fd0` refers to the top diskette drive.

```
Use the Base System Program diskettes.
```

```
Please mount volume 1 on /dev/fd0  
...and press Enter to continue.
```

```
Please mount volume 2 on /dev/fd0  
...and press Enter to continue.
```

```
Please mount volume 3 on /dev/fd0  
...and press Enter to continue.
```

```
Please mount volume 4 on /dev/fd0  
...and press Enter to continue.
```

The prompts ask you to insert each Base System Program diskette at the appropriate time and press **Enter**. After you press **Enter**, messages will indicate that processing is taking place, and a list of the files being installed is displayed for each diskette. When all Base System Program diskettes have been installed, more messages indicate the processing taking place (mounting file systems, configuring the system, and so on). Another message informs you when the Base System Program is installed successfully.

-
8. If Daylight Savings Time is used in your time zone, type **y** and press **Enter**.

Will the U.S. Daylight Savings time rules be applied
in this time zone (y/n)?

9. Next, you are prompted to continue with the post-installation procedures. Post-installation procedures handle the configuration files specific to your system, such as for your system devices.

INSTALL AND CUSTOMIZE THE BASE SYSTEM

The new version of Base System Program was installed successfully.
Post installation procedures will take several minutes.

To CONTINUE with post installation processing, press Enter.

Press **Enter** to proceed with the post-installation procedures. Your operating system installation is not complete until this processing is performed.

When the post-installation processing is completed, the SELECT LANGUAGE MENU will be displayed.

```

                                SELECT LANGUAGE MENU

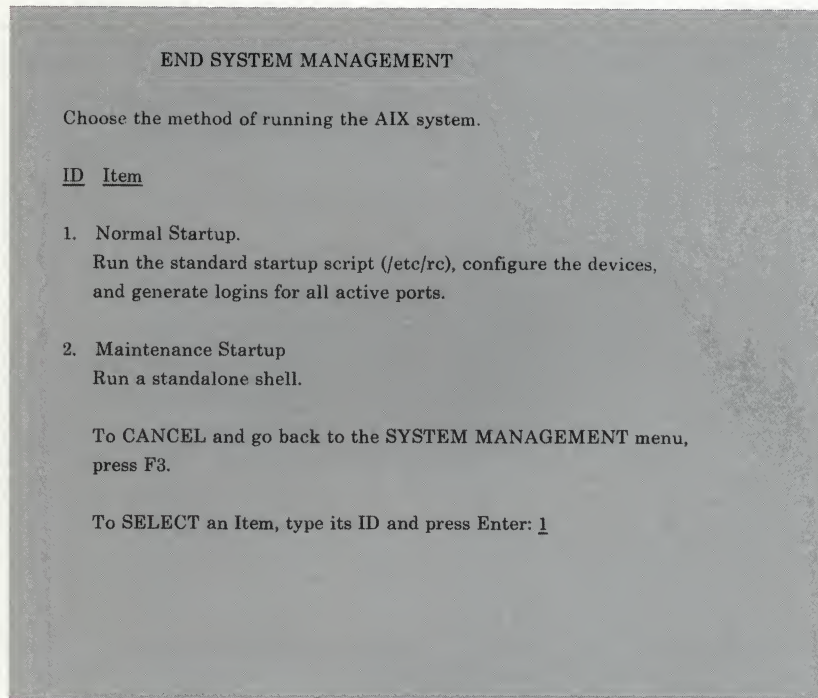
Select the language to be used.
ID  ITEM
---  ---
1   Use the current/default language.
2   Canadian (French)
3   Danish
4   Dutch
5   English (U.K.)
6   English (U.S.)
7   Finnish
8   French
9   German
10  Italian
11  Japanese
12  Norwegian
13  Portuguese
14  Spanish
15  Swedish

To SELECT an Item, type its ID and press Enter: 1

```

Note: If you are doing the initial installation or a re-installation (not a merge), the default language (item 1) is U.S. English. If you are doing a merge, the current/default language is whatever language you last chose. If you did not previously choose a language, the current/default language will again be U.S. English.

At this point you are prompted to return to the SYSTEM MANAGEMENT menu to start your system. Press **Enter** to return to the System Management menu. Select item 4, "End System Management," to choose how to start up the AIX Operating System. The following menu is displayed:



If you receive a message indicating that the programs did not load successfully, try the installation procedure again. If numbered messages appear, go to *Messages Reference* for suggested actions.

10. Read the rest of this chapter, beginning with "Logging In to the AIX Operating System" on page 4-40.

-
11. If you want to use any of the additional operating system programs, install them now with the **installp** command. Chapter 5, "Installing Additional Operating System Programs," describes all the additional programs and provides installation instructions. If your diskette binder contains an update diskette to the AIX Operating System, install it with the **updatep** command after the operating system (including any of the additional operating system programs) is installed. See Chapter 5, "Installing Additional Operating System Programs," for instructions on using either the **installp** or **updatep** commands.

Viewing the Current Choices



You may want to see the choices available for the Base System Program. To do so, choose item 2 on the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu.

The AIX Operating System consists of six file systems (on six minidisks). In addition, a dump minidisk is available in case of a system failure. In case of a system failure, see *Managing the AIX Operating System* for information on recovering your data.

While you may find the default settings for these minidisks satisfactory, you may also want to see the settings to determine whether you want to change them. Selecting option 2 from the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu lets you see the choices currently in effect.

After seeing the choices, you can install the Base System Program with the current choices in effect or return to the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu to select another option.

To display the current choices for the fixed-disk number, the size in blocks, and the maximum number of files, follow these steps:

To Display Current Choices

1. On the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu, type **2**, and press **Enter**.
2. On the SHOW CURRENT AND RECOMMENDED CHOICES menu, you will see the current, recommended, and possible choices for the / (root) minidisk.

To see choices for the other four minidisks, press the **Cursor Down** key.

More Detailed Information

1. On the INSTALL AND CUSTOMIZE the Base System Program menu, type **2**, and press **Enter**. Doing so takes you to the SHOW CURRENT AND RECOMMENDED CHOICES menu.
2. On the SHOW CURRENT AND RECOMMENDED CHOICES menu appear the current, recommended, and possible choices for the / (root) file system. The choices on your display may not be the same as those shown on page 4-28. The default minidisk sizes can vary according to the size of the fixed disks in your system. To determine the default sizes for your system, refer to the following table. If the only fixed disk in your system is a 40-megabyte fixed disk, use the sizes under the heading **40M System**. All other systems should use the sizes under the heading **All Others**.

Minidisk	40M System	All Others
/ (root)	20000	30000
/usr	42200	60000
/u	6000	12000
/tmp	2500	3000
/vrn	See page 1-10	See page 1-10
Paging	See page 1-10	See page 1-10
Dump	3000	6000

Figure 4-1. Default Minidisk Sizes

Note: If you are running SNA Services and Distributed Services, increase the size of your dump minidisk to 8000 blocks. If you are acting as a server in an active code-service environment, increase your dump minidisk to 10,000 blocks and your /tmp minidisk to 35,000 blocks.

To see choices for the **/usr** minidisk, the **/u** minidisk, the **/tmp** minidisk, and the Dump minidisk, use the **Cursor Down** key. You can return to a previous screen by pressing the **Cursor Up** key. If you want to install with the current choices, press **Enter**. If you want to change any of the choices, return to the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu by pressing **F3**.

SHOW CURRENT AND RECOMMENDED CHOICES

<u>/ root Minidisk:</u>	<u>Current</u> <u>Choice</u>	<u>Recommended</u> <u>Choice</u>	<u>Possible</u> <u>Choices</u>
Fixed Disk Number	0	0	0
Number of Blocks	24000	24000	1-97400
Number of Files	6000	6000	1-94336

To SEE choices for other minidisks, use the Cursor Down or Cursor Up keys

To CANCEL and go back to the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu, press **F3**.

To **INSTALL** the Base System Program with the current choices, press **Enter**.

Note: This menu shows the defaults for a 70-megabyte or larger system. If you have a 40-megabyte system, your default size will differ.

Here is some information about the choices you see on the screen:

- **Fixed Disk Number**

You can locate the file system minidisk on any internal fixed disk in your system. Notice that the **current** choices are now in effect. The **recommended** choices are the values supplied by IBM when you first receive the program. Unless you have made changes, the current and recommended choices are the same. The **possible** choices indicate the range of choices within which you may select.

- **Number of Blocks**

If you install the Base System Program with the defaults, the sizes in blocks are assigned and allocated for you. If you want to override those defaults and adjust the sizes in blocks on one or more minidisks, see the table in Chapter 1, "Planning for Installation," for information about the number of blocks each of the AIX Operating System programs contains.

- **Number of Files**

If you plan to install several programs in addition to those included in the AIX Operating System, you may, at some point, want to increase the maximum number of files. However, the number of files available generally is quite large. See the following pages to change the maximum number of files. See *Managing the AIX Operating System* for information on the file system.

Changing Choices and Installing the Base System Program



To change the current choices and then install the Base System Program, choose option 3 from the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu. See “More Detailed Information” on page 4-27 for an explanation of these items:

- Fixed-disk number on which a file system minidisk is located
- Size in number of blocks
- Maximum number of files.

Before changing any of the choices, you may want to see *Managing the AIX Operating System* for additional information on these topics.

To change the current choices and install the Base System Program, do the following steps:

To Change Choices and Install

1. From the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu, type **3** and press **Enter**.
2. From the CHANGE CURRENT CHOICES AND INSTALL menu, choose the number of the minidisk you want to change. Then press **Enter**.
3. Follow the prompts to change the choices for the fixed disk number, size in blocks, and maximum files for the file system minidisk selected.
4. Check the summary screen to make sure that the new current choices are the ones you want. If you want to make additional changes, repeat steps 2 and 3.
5. To install the Base System Program with the new current choices, type **6** and press **Enter**.
6. Turn to step 3 on page 4-13 and follow steps 3 through 9.
7. Continue reading in this chapter, beginning with "Logging In to the AIX Operating System" on page 4-40.

More Detailed Information

1. From the INSTALL AND CUSTOMIZE THE BASE SYSTEM menu, type **3** and press **Enter**.
2. From the CHANGE CURRENT CHOICES AND INSTALL menu, choose the number of the minidisk you want to change, and press **Enter**.

CHANGE CURRENT CHOICES AND INSTALL

Select a minidisk to change, or install the Base System Program

ID	Item	Fixed Disk	Number of Blocks	Number of Files
1	/ (root)	0	24000	6000
2	/usr	0	60000	15000
3	/u	0	12000	3000
4	/tmp	0	3000	625
5	Dump	0	6000	0
6	Install the Base System Program and cause the current choices to take effect.			

To CANCEL and go back to the INSTALL AND CUSTOMIZE
THE BASE SYSTEM menu,
press F3.

To SELECT an Item, type its ID and press Enter: 1

Note: This menu shows the defaults for a 70-megabyte or larger system. If you have a 40-megabyte system, your default size will differ.

For additional information on the number of blocks contained in each AIX Operating System program and the number of blocks allocated to the / (root), /usr, and /var minidisks, see the tables in Chapter 1, "Planning for Installation," and Figure 4-1 on page 4-27 .

3. Follow the prompts and supply information to change the choices for the following items for each minidisk you want to change. A separate screen appears for each of these three items (for each minidisk):
 - Number of the fixed disk on which you want the minidisk (this screen appears only when there is more than one fixed disk)
 - Number of blocks to allocate for the minidisk

-
- Maximum number of files for the minidisk (does not appear for the dump minidisk).

Note: After you select the minidisk you want to change, the system displays the maximum number of blocks available for that minidisk. This number assumes that the / (root), /usr, /tmp, and /dump minidisks have *not* yet been allocated. Therefore, if one or more of these minidisks are on the same fixed disk as the minidisk you are currently changing, you must take into consideration the number of blocks to be allocated to these other minidisks (/ , /usr, and so on).

The total number of blocks to be allocated for all minidisks on a fixed disk cannot exceed the number of blocks available on that fixed disk.

The **CHANGE CURRENT CHOICES AND INSTALL** menu shows current and recommended choices and the range of possible choices. The current and recommended choices are the same until you install the operating system with changes. At any point, you can press **F3** to cancel all changes and return to the **INSTALL AND CUSTOMIZE THE BASE SYSTEM** menu.

4. Check the summary screen to ensure that all the data shown reflects the changes you want. You can still make changes to any of the information displayed by repeating steps 2 and 3.
5. After making all your changes and returning to the menu that shows all choices for the minidisks, type **6**, and press **Enter** to make the changes take effect.
6. Follow steps 3 through 9 beginning with step 3 on page 4-13.
7. Continue reading the rest of this chapter.

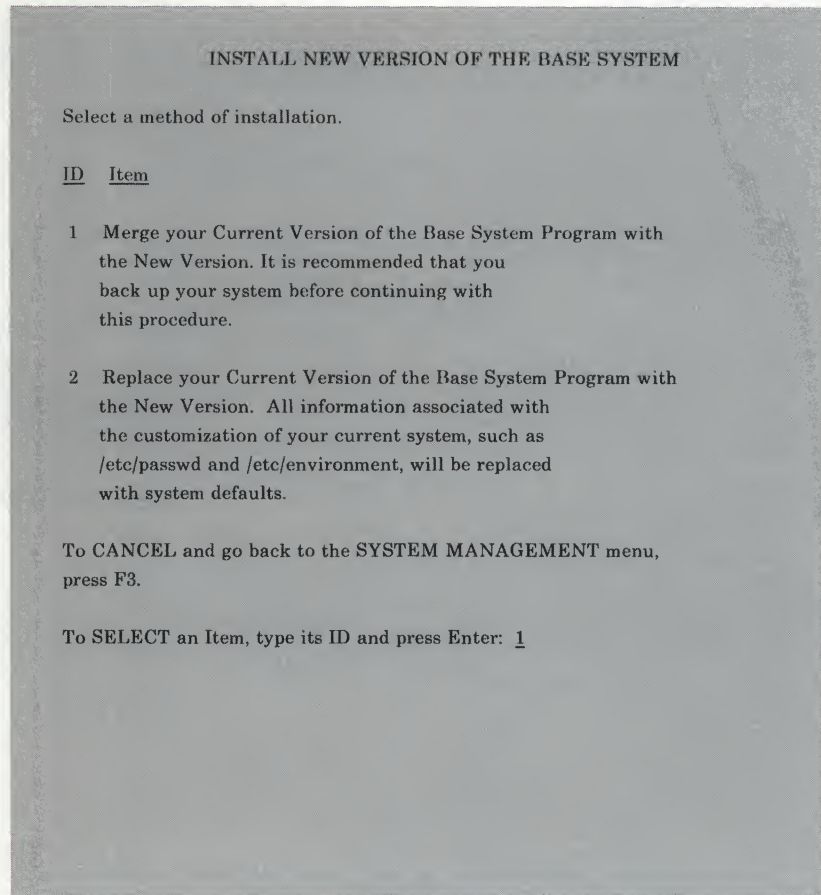
Backing Up Your AIX Operating System

After you have installed the AIX Operating System and any additional licensed programs, you should make backup copies of all your minidisks. Having backup diskettes (or tapes) helps protect you against possible loss of programs and files. Make sure you have several formatted diskettes to contain the backup data. If you are backing up to tape, note that the default setting for the streaming tape drive (**/dev/rmt0**) causes the tape to rewind after each file system or minidisk is backed up. Either use a separate tape for each minidisk to be backed up, or change the tape setting to **/dev/rmt4**, which does not rewind the tape after each backup operation. See *Managing the AIX Operating System* for more information about backup procedures and security concerns.

To back up the operating system VRM minidisk, you must use the **cvid** command discussed in *Managing the AIX Operating System* and in *AIX Operating System Commands Reference*.

Reinstalling the Base System Program

If you have previously installed the Base System Program on your RT system and you select item 1 (Install and Customize the Base System Program) from the SYSTEM MANAGEMENT menu, the INSTALL NEW VERSION OF THE BASE SYSTEM menu is displayed.



Choosing to merge or replace your existing Base System Program with the new version depends on your specific needs and the amount of customization you have done to your existing system. Both methods are described in the following sections.

Merging the Base System Program with a New Version

If you have been using the Base System Program, you may have changed default values, added files and devices, and performed other customization procedures on your configuration files. You may have defined your own minidisks for data, licensed programs, and so on.

The merge option, which is the default path for reinstalling the Base System Program, allows you to save your customized files by listing all the files on your current system that differ from those about to be installed. You can then back up these customized files, install the new version of the Base System Program, and add your modifications to the new files as desired.

The merge of the configuration files is handled separately by the post-install configuration procedure. This procedure also gives you a chance to back up configuration files that will be modified or replaced. See "Post-Install Configuration Procedures" on page 4-38.

If you plan to back up your customized files, be sure you have enough media (formatted diskettes or tapes) to contain the data you want to back up. The amount of media required depends on the number and size of the files to be backed up.

Note: The configuration files that were backed up should only be used if you modified any of these files yourself and you want to save the changes you made. Once the install process is complete, you can then restore these files to your own directory and modify the new configuration files with the changes. *Do not* replace the new configuration files with the backed-up version as you will lose important updates made to these files.

After you select the merge option, you are prompted to choose the device (diskette or tape) for merging the new Base System Program.

At this point, you are prompted to insert the first Base System Program diskette (volume 1). A program on volume 1 compares your existing Base System Program files with those about to be installed. If the files on your system have been modified since they were installed, you are given a chance to see a list of these files and back them up before proceeding with the merge. The following menu is displayed:

PROCESS MODIFIED TEXT FILES

Select a method of handling your modified text files.

<u>ID</u>	<u>Item</u>
-----------	-------------

- | | |
|---|---|
| 1 | Backup all text files modified since your last installation. |
| 2 | Do NOT backup text files modified since your last installation. |
| 3 | Show names of modified text files marked for backup. |

To CANCEL and go back to the INSTALL NEW VERSION OF
THE BASE SYSTEM menu,
press F3.

To SELECT an Item, type its ID and press Enter: 1

If you select item 1 from the PROCESS MODIFIED TEXT FILES menu, you must indicate the device to be used for backing up the files. After selecting the device and pressing **Enter**, the system indicates the approximate amount of media (diskettes or tape) you need to contain the backup. You are then prompted to insert the appropriate media until the backup is completed. IBM recommends that you back up modified text files before you proceed with the merge.

If you select item 2 from the PROCESS MODIFIED TEXT FILES menu, a warning screen is displayed indicating that your modified files will be replaced with system defaults.

If you select item 3 from this menu, you will see a list of the files marked for backup. This option provides additional information on these files, such as the full path name of the file and the size of the file in blocks.

After you have indicated how to process your modified text files, a menu will prompt you to proceed with or cancel the merge. Press **Enter** to proceed or **F3** to cancel.

At this point, you are prompted to insert the operating system diskettes (beginning with volume 1) until all are installed.

Post-Install Configuration Procedures

The configuration files, which contain information for customizing devices on your system, are updated or replaced when you select the merge option for reinstalling the Base System Program. The configuration files are changed to provide your system with the most current support for devices, keywords, and so on, without requiring you to reconfigure the entire system.

Before any configuration files are changed, however, a list is displayed that indicates which files will be updated and which will be replaced. In general, the device-specific configuration files (such as `/etc/system` and many of the `/etc/ddi` files) are updated and the system-wide support files (`/etc/rc`, `/etc/master`, and `/etc/predefined`) are replaced. At this point, you are given an opportunity to back up these files before any changes are processed.

IBM recommends you perform this backup so you will have a record of your current configuration. This backup is particularly important if you have changed the files that will be replaced (`/etc/rc`, `/etc/master`, `/etc/predefined`).

Note: The configuration files that were backed up should only be used if you modified any of these files yourself and you want to save the changes you made. Once the install process is complete, you can then restore these files to your own directory and modify the new configuration files with the changes. *Do not* replace the new configuration files with the backed-up version as you will lose important updates made to these files.

To back up the configuration files, type `y` when the prompt is displayed. One diskette is required to contain the backup data.

A message is displayed when the post-install configuration procedure completes successfully. This message lists the files that were replaced so you can merge your previous versions of these files into the new versions, if desired.

If the configuration file updates are unsuccessful for any reason, an error message will be displayed. This message indicates whether the error occurred during update of the `/etc/ddi` files or one of the other files for which update was attempted.

If an error occurred during the `/etc/system` update, all configuration files will be replaced by files from the new version of the Base System Program. If you added any devices to your previous system, you must use the **add** option of the **devices** command to add the device to the new version. If you created any minidisks on your previous system, you must run the **mdrc** command to recall these minidisks to the new version.

If an error occurred during update of the `/etc/ddi` files, the `/etc/ddi` files displayed on the POST-INSTALL CONFIGURATION PROCEDURE menu will be replaced by files from the new version of the AIX Operating System. In this case, customization of device-dependent information is lost. If you added any devices to your previous system, the devices may work differently (or not at all) from the way they worked on your previous system. You may have to run the **change** option of the **devices** command to set the device-dependent information to the values you were using with your previous system.

After the Base System Program is successfully installed and post-installation processing is complete, press **Enter** to return to the SYSTEM MANAGEMENT menu. Select item 4, "End System Management," and indicate whether you want to start up your system in normal or maintenance mode.

Replacing the Base System Program with a New Version

Warning: Reinstalling the Base System Program with the replace option rather than the merge option replaces the contents of the files on the / (root), /usr, /tmp, and dump minidisks, as well as device and configuration files. Be sure to back up files you want to save before you replace the AIX Operating System.

Replacing your existing version of the Base System Program with a new version is very similar to installing the Base System Program for the first time. You have the same options (installing with defaults, showing the current choices, and changing the current choices and installing) as you do with the first Base System Program installation. See "Installing the Base System Program with Defaults" on page 4-12 for a detailed description of the steps and options available to you as you reinstall the Base System Program.

If you reinstall the Base System Program without changing any characteristic of the /u minidisk, the user data on that minidisk remains intact.

However, you will be unable to access minidisks that you have created until you run the **mdrc** command. "Accessing User-Created Minidisks After Reinstalling (Using the Replace Option)" on page 7-40 describes the **mdrc** command.

For information on backing up the files on your minidisks, see *Managing the AIX Operating System*.

Logging In to the AIX Operating System

Earlier, you chose to have the system either log you in automatically, without asking for your user name and password, or ask you for your user name and password. The steps you follow to log in to the system vary, depending upon the option you chose.

To Log Into the AIX Operating System

1. If your system is not running,
 - a. Turn the keylock to the unlocked position.
 - b. Turn on the power switches.
 - c. If necessary, enter your user name. (Generally, you should type information in lowercase letters. If you mistakenly type in uppercase, log off and then log in to the system again.)
 - d. If necessary, enter your password.
2. If your system is running,
 - a. If necessary, enter your user name.
 - b. If necessary, enter your password.

More Detailed Information

1. Turn the keylock to the unlocked position.
2. Turn on the power switches. As described in Chapter 2, "Getting Ready to Install the AIX Operating System," when you start your IBM RT system, the system goes through a series of internal tests before it is ready to use. While these procedures are running, various messages about system activities display on the screen. Depending upon a number of variables, these procedures usually take several seconds to run, but can take longer. When the system is ready, it displays a two-line copyright statement.
3. If necessary, enter your user name in lowercase letters. Should you mistakenly use all uppercase letters, log off the system (see next page) and log in again, using lowercase letters. If your terminal does not accept lowercase, you can use uppercase. If you chose to be prompted for your user name, enter it after the prompt `login` and press **Enter**. If your system does not require a user name, the message `Autologin of (user name)` is displayed, followed by the shell (\$) prompt. You are now ready to begin using the system.

-
4. If necessary, enter your password. If you have just installed the AIX Operating System and have no password, you will not be prompted for one. Instead, you will see the \$ or # prompt. If you do have a password and enter it when requested, the \$ or # prompt appears.

For security reasons, the system does not display your password as you type it. See *Managing the AIX Operating System* for information on passwords and security procedures.

The system is now ready to accept a command.

If your system redisplay the login prompt, you are not logged in. Try to log in again. You may have typed your password incorrectly.

Logging Off the AIX Operating System

You can log off the system in two ways:

- Log off and leave the system running for others to use
- Log off and turn off the system.

Follow these instructions to log off and leave the system running:

To Leave the System Running

1. Be sure that the `$` or `#` prompt is displayed on the screen.
2. Press **Ctrl-d**.

To log off the system and turn off the power to the system, follow these steps:

To Log Off and Stop the System

1. Be sure that the `$` or `#` prompt is displayed on the screen.
2. Type `shutdown`. Then press **Enter**. See the warning on the following page.
3. All users are now informed of the impending shutdown. To proceed with the shutdown, type `y` and press **Enter** when prompted.
4. Turn off the power to the system.

More Detailed Information

Warning: It is very important that you use the **shutdown** command before you turn off the power to your system. Failure to do so can result in the loss of data in memory, damage to the AIX Operating System, or both.

When you issue the **shutdown** command, the system notifies all users of the impending shutdown. After a short interval, you are prompted to indicate whether to proceed with the shutdown. Type `y` and press **Enter** to proceed with the shutdown.

If you have a stand-alone or single-user system and want a fast shutdown, type the **shutdown -f** command. This command bypasses the messages to other users and brings the system down as quickly as possible.

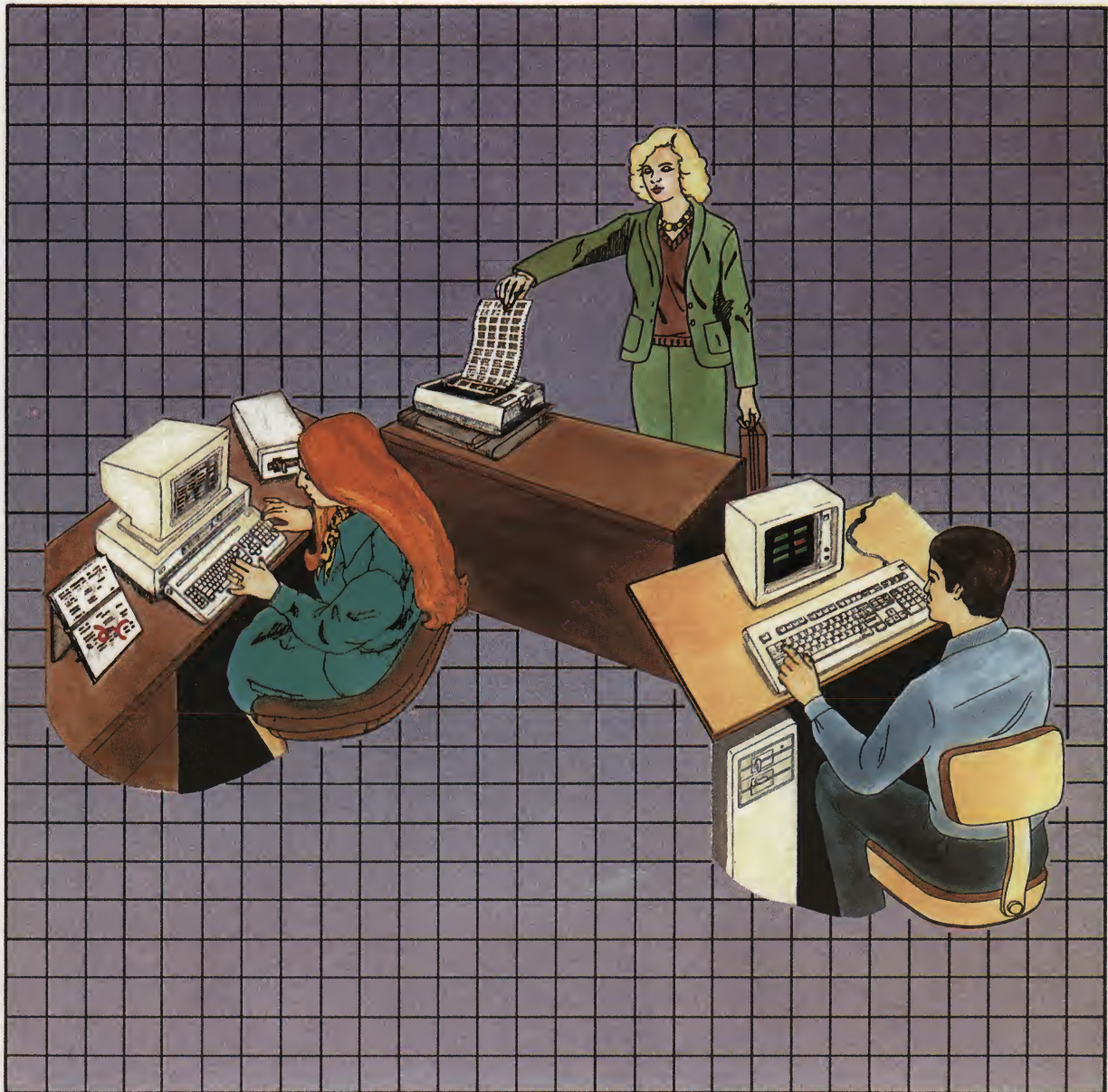
When the AIX Operating System stops running, you receive the message:

. . .shutdown completed. . .

Note: Only certain system users can use the **shutdown** command. These users are responsible for shutting down the system. If you are not the person responsible for shutting down your system, log off, and leave the system running.

For more information about **shutdown**, see *Managing the AIX Operating System*.

Chapter 5. Installing Additional Operating System Programs



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About This Chapter

This chapter explains how to install additional operating system programs (after installing the Base System Program) by using the **installp** command. It explains how to install these programs:

- INed
- Usability Services
- Asynchronous Terminal Emulation
- Multi-User Services
- Extended Services
- Base PC Network Services
- Exploring Usability Services
- Interface Program for use with TCP/IP
- VRM Device Driver Diskette
- SNA Services
- Update to Operating System.

These programs are installed with the **installp** command. If you have an update diskette for any of the AIX Operating System programs, see "Updating Additional Programs" on page 5-15 for installation instructions.

You can also tailor your system so that it starts up in the AIX shell, DOS Services, or Usability Services.

Selecting Additional Programs

The programs described below are part of the AIX Operating System received with your IBM RT system. You can choose to install none of the programs, or one or two, or all of them. IBM recommends that you install the programs in order, according to the amount of use they will receive. For instance, if you believe that you will use the INed program most, you should install it first. If you plan to install all of the additional programs, you may want to install them in the sequence in which they are described in this chapter.

If you are in an active code-service environment and the additional operating system programs you want to use are already installed on the server, you usually do not need to install these programs on your system. However, Base PC Network Services must be installed on both the server and on the client.

INed

The INed program is a full-screen text editor that enables you to enter programs, memos, and other text documents into files. By using the INed key commands, you can view, revise, and delete files.

Usability Services

Usability Services provides a menu-driven program that lets you choose how to use your system. Usability Services translates the commands you select into ones that the AIX Operating System understands. Usability Services also lets you open several virtual terminals at once (these are not asynchronous terminals).

Asynchronous Terminal Emulation

Asynchronous Terminal Emulation allows you to establish a connection between your work station and another computer. Your work station acts as a terminal connected to that computer. Asynchronous Terminal Emulation provides a way to establish the connection and allows you to record and control the session. Asynchronous Terminal Emulation can be used to connect to, and exchange data with, remote private data bases and other AIX systems. After logging in to the remote system, you can execute programs, issue commands, and use files on that system as a local user.

Multi-User Services

Multi-User Services provides these functions:

- Accounting capabilities for managing the system, including resource management and online labor distribution
- Group conferencing and messaging capabilities
- Programming and graphics support for specified terminals
- Device support for most RT graphics displays, printers, and plotters.

Each component in Multi-User Services is separately installable. You can install the entire program or only those components you believe you will use. If you do not need the entire program, you can save minidisk space for other uses by selecting and installing only those components you need.

These are the separately installable components:

- Accounting Support (process and activity accounting)
- System Activity Recording (recording of system activity)
- Inter-Workstation Commands (conferencing, messaging)
- Terminal Support (terminal functions)
- Advanced Display Graphics Support Library (program interface for graphics applications used with certain displays)
- Graphics Device Drivers (support most RT graphics displays, printers, and plotters) — These device drivers can be used with the IBM RT Professional Graphics Series licensed program (see the documentation with the licensed program) or the with the Graphics Support Library subroutines (see *AIX Operating System Technical Reference*).
- Graphics and Statistics Commands (access graphic and numeric commands and provide tools for analyzing numerical data)
- HFT Examples Programs

See “Minidisk Size Requirements” on page 1-16 for information on the required block sizes of each component.

Extended Services

Extended Services provides additional AIX commands and subroutines to complement the AIX commands already part of the AIX Operating System. You can also install DOS Services, which is a program that translates DOS-like commands into a form the AIX Operating System can understand. Extended Services contains the following features:

- Translation of DOS-like commands for AIX Operating System processing
- Text processing/typesetting functions
- Application development tools, including:
 - System commands
 - Source Code Control System
 - Miscellaneous languages and processes

-
- Enhanced file system functions
 - Enhanced data manipulation functions
 - Enhanced system management functions
 - Electronic mail/file interchange
 - Games.

Each component in Extended Services is separately installable. You can install the entire program or only those you believe you will use. If you do not need the entire program, you can save minidisk space for other uses by selecting and installing only those components you need.

These are the separately installable components:

- Administrative Support (directory profiling, password check, archiving, terminal information)
- DOS Services
- Extended Programming Support
- Source Code Control System
- Text Support (text processing/typesetting functions)
- uucp, ct, cu Support (copying one or more sources from one system to a single destination on another system)
- vi Editor (full-screen editor)
- Games
- Sendmail (network message routing functions)
- MH (Message Handling) Package (alternative to mail command for sending, receiving, and handling messages).

See “Minidisk Size Requirements” on page 1-16 for information on the required block sizes of each component.

Base PC Network Services

Base PC Network Services provides the basic support for the IBM RT system and the IBM Personal Computer to exchange messages and data across the IBM PC Network to another IBM RT system using the IBM PC Network Adapter.¹ This program is designed to be a general service program, usable by your application programs or by other IBM RT-compatible programs. If you are in an active code-service environment, Base PC Network Services must be installed on both the server and on the client.

¹ IBM no longer sells or supports the PC Network Adapter.

Exploring Usability Services

The Exploring Usability Services diskette is an online tutorial designed to introduce you to the functions available through the Usability Services program. The exercises it provides should help you become familiar with the capabilities of Usability Services. You should install Usability Services before using Exploring Usability Services.

Interface Program for use with TCP/IP

Interface Program for use with TCP/IP supports certain communications protocols, commands, and an applications programming interface. These features allow an RT system and another system with equivalent protocols to transfer files, relay mail, and perform network management tasks. In addition, Interface Program for use with TCP/IP allows remote connection to a host system and remote login capability.

To install an additional program, follow these basic steps:

To Install an Additional Program

1. Make sure that no one else is using the system and that no user programs are running.
2. Log in as superuser or as a member of the system group.
3. Type `installp`. Then press **Enter**.
4. When requested to do so, insert the appropriate diskette into the top diskette drive (drive 0 in position A).
5. Follow the prompts to install the additional program. If the program has multiple diskettes, the system tells you when (and in what sequence) to load them. As various files are restored from the diskette, they may be listed on the screen. If a program has components that can be installed separately, a menu will let you select the components you want to install. See "Installing Programs with Separate Components" on page 5-14 for more information.
6. When installation is complete, remove the diskette and return it to its protective diskette holder in the binder. In some cases, the system may restart at this point. If so, a message will advise you.
7. Log off as superuser or as a member of the system group.

If you install Usability Services, you can perform many of the same tasks that you can do from the AIX shell, including the installation of programs described above.

Warning: You must install Usability Services from the AIX shell. Do not attempt to install Usability Services from within Usability Services. Doing so may damage certain files.

Installing Programs with Separate Components

Some programs have components that can be installed separately, enabling you to select only those components you plan to use. Multi-User Services, Extended Services, and the VRM Device Driver have components that you can select, thus saving minidisk space for other uses.

To install these components, you type `installp`, insert the diskette, and then select the components from a menu.

The following discussions of related files may be useful to you as you install and later update the components.

History Files

A separate history file is maintained for each component. For example, a separate history file is maintained for vi editor, Sendmail, and Message Handler.

During compatibility checking in an active code-service environment, if a component on the client is found to be incompatible with the server, you can locate the appropriate program copy required to make it compatible. This is accomplished by the addition of an entry in the history file to identify the program copy that was used to install the component on the server.

For additional information about history files, see *Managing the AIX Operating System*.

Updating Additional Programs

You may have received an update diskette with the other diskettes in the AIX Operating System. And, in the future, you may periodically receive one or more diskettes containing updates to the operating system programs. The updates may consist of enhancements or changes to one or more programs.

You will want to apply the updates to use the enhancements and changes. You should install all AIX programs that you plan to install before you apply the update diskette. To apply an update diskette, you use the **updatep** command.

The **updatep** command lets you apply and commit numerous licensed programs with only one kernel rebuild. If you specify **updatep -ac**, a list displays that contains all possible licensed programs that have updates. This list includes those licensed programs that require special processing, such as kernel rebuilds. You can select a single licensed program, multiple licensed programs, or all licensed programs from the list. The licensed programs are applied in the order they are selected. If all licensed programs are selected, they are applied in the order they appear on the list. If any of the licensed programs requires a kernel rebuild, a single kernel rebuild occurs after all the selected licensed programs have been applied. To update several programs, see "To Update Several Programs" on page 5-16.

If you specify **updatep -a**, licensed programs that require a kernel rebuild are applied one at a time. This requires numerous kernel rebuilds and system reboots. To update one existing program or to update several programs with a kernel rebuild after each update, see "To Update a Program" on page 5-17.

Should an error message display on the screen, see *Messages Reference* for details. For a detailed discussion of the **updatep** command and its parameters, see *AIX Operating System Commands Reference*.

To update several programs with only one kernel rebuild, follow these basic steps:

To Update Several Programs

1. Restart your system.
2. Make sure that no other terminals are enabled and that no programs are running. You must be a member of the system group to use **updatep**.
3. Insert the update diskette into the top diskette drive.
4. Type **updatep** with the **-ac** (apply/commit) option (**updatep -ac**). Then press **Enter**.
5. From the Apply Updates menu, type the numbers of the programs you want to update, and press **Enter**.
6. When the update has been applied/committed and the files restored, the system may restart or provide messages for your benefit. When you see a message indicating that the update process has completed, remove the update diskette.
7. Log off as a member of the system group. You can now continue with other tasks.

If an error occurs during the kernel rebuild, the licensed programs are automatically rejected and must be reinstalled. Those licensed programs that did not require a kernel rebuild complete the apply/commit process and will not be displayed. See *AIX Operating System Commands Reference* for more information.

To update one existing program or to update several programs with a kernel rebuild after each update, follow these basic steps:

To Update a Program

1. Restart your system.
2. Make sure that no other terminals are enabled and that no programs are running. You must be a member of the system group to use **updatep**.
3. Insert the update diskette into the top diskette drive.
4. Type **updatep** with the **-a** (apply) option (**updatep -a**). Then press **Enter**.
5. From the Apply Updates menu, type the numbers of the programs you want to update, and press **Enter**.
6. When the update has been applied and the files restored, the system may restart or provide messages for your benefit. When you see a message indicating that the update process has completed, remove the update diskette.
7. Log off as a member of the system group. You can now continue with other tasks.

The **updatep** command enables you to apply, commit, or reject updates to the programs in the AIX Operating System.

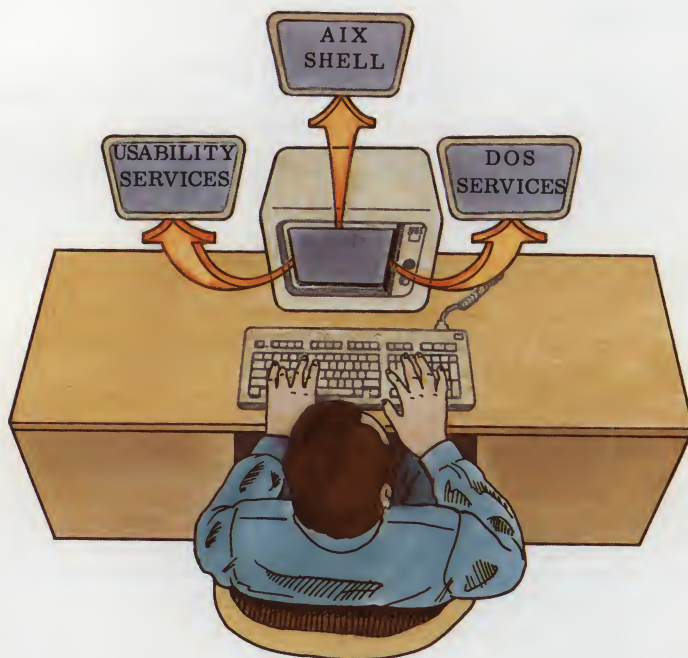
When you apply an update, you update the existing program on your system. You can use the updated program for some time to determine whether it is more acceptable to you than the previous level of the program.

If you decide that the updated program is satisfactory, you can decide to commit the update. When you commit an update, you remove the previous level of the program from your system and permanently update the existing program with whatever enhancements and changes may be on the updated program.

If you decide that the updated program is not satisfactory, you can decide to reject the update. In this case, you decide that you will bring your program back to its former state, before you applied the update. However, once you have committed the update, you cannot later reject the update and return the program to its former state without performing a reinstall. See *AIX Operating System Commands Reference* for more information.

Starting from the AIX Shell, Usability Services, or DOS Services

Ordinarily, you operate your system from the AIX shell. The AIX shell accepts and interprets commands for the operating system. But if you have installed Usability Services, you can tailor your system so that after it starts, it goes immediately to Usability Services. In addition, you may want to have your system start in DOS Services if you have installed it.



The following sections explain how to start Usability Services and DOS Services from the AIX shell and how to tailor your system to start in Usability Services or DOS Services when you turn on your system.

Starting Usability Services from the AIX Operating System

To start Usability Services from the AIX shell, do these steps:

To Start Usability Services

1. After the system prompt, type `actmng`.
2. Press **Enter**.

Starting Usability Services Automatically

To cause Usability Services to start automatically after you log in to the system, do these steps:

To Start Usability Services Automatically

1. If you do not already have a user name, see *Managing the AIX Operating System* for information.
2. On the command line, type `users`, and press **Enter**.
3. When the `users` command list displays, type `C U username` and press **Enter** to go to your user profile.
4. To make changes to the displayed information, type `n` after the `OK? (y)` prompt. Then press **Enter**.
5. Type `program` as the name of the field you want to change. Then press **Enter**.
6. Type `/usr/bin/actmngr` as the information for the program field. Then press **Enter**.
7. Type `y` at `OK? (y)` prompt and press **Enter** to update.
8. Type `q` to exit the `users` command.

Now, after you log in, the system starts Usability Services automatically.

Starting DOS Services from the AIX Shell

You can start DOS Services from the AIX shell with the **dos** command. Follow these steps:

Starting DOS Services from the AIX Shell

1. After the system prompt, type **dos [-a]**.
2. Press **Enter**.

1. After the system prompt, type **dos [-a]**.

The **dos** command starts the DOS Services. **-a** is an optional flag that starts the DOS Services without searching for an **autoexec.bat** batch file.

You may have or may want to create an **autoexec**. An **autoexec** is a DOS Services batch program that runs automatically when you start DOS Services. This program must be named **autoexec.bat** and must be in the root directory. An **autoexec** is useful for setting paths, prompts, and other features of DOS Services that you use often. For more information on **autoexecs**, see the optionally available *DOS Services Reference*.

If you do not want your **autoexec** to run when you start the DOS Services, type **dos -a**.

2. Press **Enter**.

Starting DOS Services Automatically

To cause DOS Services to start automatically after you log in to the system, do these steps:

To Start DOS Services Automatically

1. If you do not already have a user name, see *Managing the AIX Operating System* for information.
2. On the command line, type `users`, and press **Enter**.
3. When the `users` commands list displays, type `C U username` and press **Enter** to go to your user profile.
4. To make changes to the displayed information, type `n` after the `OK? (y)` prompt. Then press **Enter**.
5. Type `program` as the name of the field you want to change. Then press **Enter**.
6. Type `/usr/bin/dos` as the information for the program field. Then press **Enter**.
7. Type `y` at `OK? (y)` prompt and press **Enter** to update.
8. Type `q` to exit the `users` command.

Now, after you log in, the system starts DOS Services automatically.

Chapter 6. Customizing System Devices



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About This Chapter

This chapter explains how you can customize your IBM RT System by using the **devices** command to:

- Add devices to your system
- Change information about devices in your system
- Delete devices from your system.

This chapter also explains how you can display information about devices in your system. By following the steps to add or delete devices or to change information about devices, you can customize your system with IBM-defined devices. Customizing with devices not defined or supported by IBM may require extra steps and extra information.

Using Devices to Customize Your System

If you are using the **devices** command for the first time, see the “Devices Information Form” delivered with your system unit. By following instructions on the form, you may be able to simplify the configuration process.

After installing the AIX Operating System, you should be ready to begin using your system. You may, however, want to add some of the optional devices supported by IBM. To do so, you use the **devices** command. With the **devices** command, you can also remove devices from your system, and you can also display and change information about devices.

Adding devices, removing them, and changing the information that describes them are ways that you customize your system. If you are using IBM-supported devices, you can customize your system with standardized procedures. If the devices are not IBM-supported, you may need to take extra steps to customize your system. You should also recognize that while the **devices** command does the processing required to configure devices into your system, the device must be properly set up. See the installation instructions shipped with the device for details.

Before you begin using the **devices** command, read the following sections to learn how to supply the information **devices** will request from you. This chapter contains several examples of using the **devices** command. You should be able to find an example similar to the task that you want to do. Following the example closely should guide you in doing your own task.

If you have the Personal Computer AT Coprocessor in your system, you have the option of making some devices shareable. For instance, you might add a printer that both the Personal Computer AT Coprocessor and your RT system can use. However, both cannot use the device simultaneously.

IBM-Defined Devices

In addition to the IBM-defined standard devices that were configured automatically as part of your operating system, you can add many other IBM-defined devices to your system.

The following chart describes representative devices supported by IBM:

- The Device Class is the name for the category (for example, terminal or printer).
- The Device Type is the name that identifies the device.
- The Device Description provides you with information about the device type. For instance, 5152 (type) is an IBM PC Graphics Printer (description).

Device Class	Device Type	Description
adapters	dft	Distributed Function Terminal
adapters	mpd	Multiprotocol Adapter
adapters	net	VRM Baseband Adapter Device Driver
adapters	pseudobio	Pseudo Block I/O
coprcdev	coprcdev0 through coprcdev9	Coprocessor-only devices (up to 10)
coprcdev	3812, 3852, 4201s, 4201p, 4202s, 4202p, 5152, 5182, 5201p1, 5201p2, 5202, 6180, 6184, 6186, 7371, 7372, 7374, 7375, tty	Coprocessor-shareable devices (printers and ttydevs). A shareable device (a printer, for instance) is one that both the Coprocessor and the IBM RT system can use. However, both cannot use it simultaneously.
datalinks	ethllc	VRM Standard Baseband Data Link Control
datalinks	eth3llc	VRM IEEE 802.3 Baseband Data Link Control
datalinks	sdlc	VRM Synchronous Data Link Control
datalinks	trllc	VRM Token-Ring Data Link Control
floating	floating	IBM RT Floating-Point Accelerator
printer	3812	IBM Pageprinter (3812)
printer	3852	IBM 3852 Color Jet Printer Model 2
printer	4201s	IBM 4201 Proprinter, serial port
printer	4201p	IBM 4201 Proprinter, parallel port
printer	4202s	IBM Proprinter XL, serial port
printer	4202p	IBM Proprinter XL, parallel port
printer	5152	IBM PC Graphics Printer
printer	5182	IBM PC Color Printer
printer	5201p1	IBM PC Quietwriter Printer Model 1
printer	5201p2	IBM PC Quietwriter Printer Model 2

Device Class	Device Type	Description
printer	5202	IBM 5202 Quietwriter III Printer
printer	6180	IBM 6180 Color Plotter
printer	6184	IBM 6184 Color Plotter
printer	6186	IBM 6186 Color Plotter
printer	7371	IBM 7371 Plotter
printer	7372	IBM 7372 Plotter
printer	7374	IBM 7374 Color Plotter
printer	7375	IBM 7375 Color Plotter (Model 1 or 2)
ptydev	pts	Asynchronous Pseudo-Terminal
scsi	disk	IBM 9332 DASD
scsi	other	Other SCSI devices
tape	tape	IBM RT Streaming Tape Drive
ttydev	tty	Any device on an async port (except printers)

While you do not have to use the **devices** command to add a second diskette drive, you do have to edit a file to mount the diskette drive automatically. See *Managing the AIX Operating System*.

Customization Files

Your system uses two types of files in customization activities: configuration files and device-dependent information files. These files contain information about the IBM-supported devices and about the devices installed in your system. The **devices** command keeps these files updated as you add a printer, for instance, or change some of the device information.

After you have installed the AIX Operating System, and the additional programs described in Chapter 5, "Installing Additional Operating System Programs," and after you have customized your system by adding devices and user information, you should back up your files to prevent the loss of valuable information. See *Managing the AIX Operating System* for details.

A description of the configuration files and the device-dependent information files follows:

Configuration Files

You can learn more about the various configuration files from *Managing the AIX Operating System*. In some cases, you may want to read or edit them. Detailed information about system configuration is recorded in these files.

The following files contain information about your system configuration:

- **/etc/master** — Contains configuration information about IBM-supported devices for the system, including kernel and Virtual Resource Manager device drivers.
- **/etc/predefined** — Contains configuration information about IBM-supported devices for the system, but does not contain device driver information.
- **/etc/system** — Contains configuration information about IBM-supported devices currently configured in your system. This file is similar in format to the **/etc/predefined** file.
- **/etc/ddi** — A directory that contains device-dependent information; the number and types of files in this directory depend upon the options and programs installed. See the next section for more information on these files.

Device-Dependent Information Files

Device-dependent information files contain information describing a particular device. For example, a printer's device-dependent information includes such items as port address (where the device is attached), color (whether the printer has color), left and right margin settings, and so on. You can change some of these items, but not all of them. For instance, while you cannot change the color characteristic of a printer, you can change the margin settings. Some devices and adapters have no information that can be changed.

As you use **devices**, you will notice that the **showdev** command shows you all the device information. The **add** and **change** commands show only the device information that you can change.

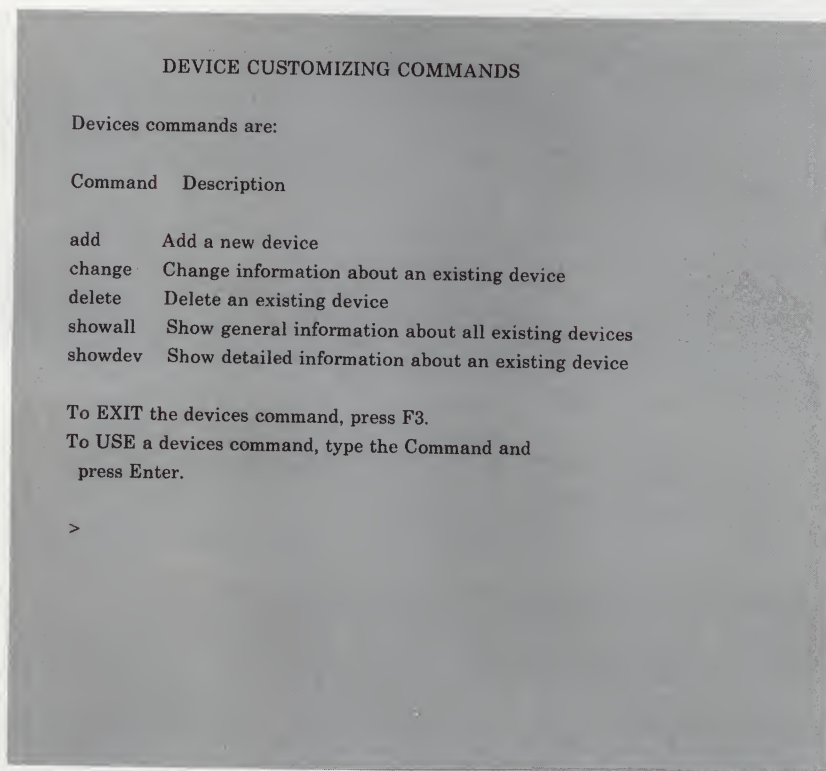
The device-dependent information files are contained in the **/etc/ddi** directory. For example, the device-dependent information file for the asynchronous device is **/etc/ddi/tty**. The files for a serial printer and a parallel printer are **/etc/ddi/sprinter** and **/etc/ddi/pprinter**, respectively.

To learn more about using device-dependent information, turn to Appendix B, "Keyword Descriptions." Keywords are an important part of the ddi files. You may occasionally want to change defaults for a printer or other device. To do so, you should understand the meanings of the keywords so that you can make better choices. Appendix B, "Keyword Descriptions," provides a brief description of these keywords and of the various choices available for each keyword.

Getting Ready to Use the Devices Command

Now that you understand the general purposes of the **devices** command, the IBM-defined devices, and the customization files, you can prepare to use the choices on the DEVICE CUSTOMIZING COMMANDS menu.

When you see the DEVICE CUSTOMIZING COMMANDS screen, you can begin using any of the **devices** commands.



The following sections describe how to use **devices**.

Starting and Exiting Devices

To start **devices**, you must first be logged in as a member of the system group or you must have superuser authority. The **#** prompt appears when you are logged in as superuser. The **\$** prompt appears when you are logged in as a system or regular user. After the system prompt, type **devices** and press **Enter**. See *Managing the AIX Operating System* for information about devices.

Using Abbreviated Commands

To reduce the number of keystrokes you must enter, you can abbreviate the **devices** commands, the device class, device type and adapter fields, and the yes/no responses. Simply type the letters that uniquely identify the desired command, device, or response. For the **add**, **change**, and **delete** commands, you can type a single letter or multiple letters, as in: **a**, **ad**, or the full **add**. Or you can type **c**, **ch**, **cha**, and so on for **change**.

For the **showall** and **showdev** commands, however, you must type at least **showa** or **showd** to identify the desired command.

Whenever you are asked to type **yes** or **no**, you can type **y** or **n**.

If you already know the device class and device type for the device you want to add, change, delete, or show, you can enter valid abbreviations for the command, the device class, and the device type. For example, **a pr 5152** adds a 5152 printer. To add a tty or streaming tape device, type an **a tt tty** for tty or **a ta tape** for tape. Entering these three items means that you can bypass the lists of device classes and device types.

Handling Errors

If you should supply an incorrect response while responding to **devices** prompts, you will be asked again to supply correct information. If you are unable to supply correct information and want to go back to the **DEVICE CUSTOMIZING COMMANDS** screen, press **F3**.

Adding a Device May Require Restarting the AIX Operating System

To be recognized by the system, some devices require restarting the AIX Operating System after you add them to the system configuration. Another word for a system restart is **initial program load** (or **IPL**). Restarting means that the system loads the AIX Operating System and the changes you have made in order to begin operation. If necessary, the system automatically restarts at the end of the **devices** session after you press **F3**.

In these cases, a message tells you that a restart will occur if you confirm your request to exit **devices**. This message will also tell you not to exit **devices** as a kernel rebuild is taking place. The rebuild will take several minutes and the IPL will be performed after the rebuild is complete. You can, however, complete any other devices activity before pressing **F3** to restart the system. Make certain that no other users are using the system and that no user programs are running when the restart occurs.

When you exit, a kernel rebuild will be performed.
This will take several minutes.

An IPL will be performed after the kernel rebuild
has completed.

Exit Devices?

yes
no

To CANCEL and return to the list of commands, press F3.
To CHOOSE, type yes or no and press Enter.

If restarting is not required as you exit **devices**, you will return to the \$ or # prompt.

Understanding the Devices Commands

The five devices commands are:

- **add**
- **change**
- **delete**
- **showall**
- **showdev.**

When you type **devices** after the system prompt and press **Enter**, the **DEVICE CUSTOMIZING COMMANDS** screen appears. Each time you want to use a **devices** command, you must begin with this screen.

DEVICE CUSTOMIZING COMMANDS

Devices commands are:

Command	Description
---------	-------------

add	Add a new device
change	Change information about an existing device
delete	Delete an existing device
showall	Show general information about all existing devices
showdev	Show detailed information about an existing device

To EXIT the devices command, press F3.

To USE a devices command, type the Command and press Enter.

>

The following sections provide information on each command. In this chapter, you will also find examples of using each command.

Adding Devices

With the **add** command, you can do these tasks:

- Add IBM-defined devices to your system
- Assign a device for use by the Coprocessor, if your system has one
- Add an unsupported printer to your system.

Changing Device Information

The **/etc/ddi** (device class) files contain information about your system devices. Each time you add a device, you can see information about the device in the **/etc/ddi** file for that device class. While you may find most default settings or choices acceptable, you may also want to change some settings. Before you do so, read the keyword descriptions in Appendix B, "Keyword Descriptions," to better understand whether you need to change device settings.

With the **change** command, you can display any device or adapter settings that can be changed.

Note: If you use the **change** option of the **devices** command to change any of the settings for your system devices and you notice that your requested changes are not implemented, perform either of the following steps:

- Issue the following commands:
 - **vrmlconfig -d <device name>**
 - **vrmlconfig -a <device name>**

where **<device name>** is the name of the device on which you did the **change**. Note that **vrmlconfig -d** will not work if the device is in use.

- Perform a re-IPL of the system after issuing the **shutdown** command.

Deleting Devices

You can use the **delete** command to delete almost any device in your system. You can physically remove the device either before or after you delete it from your system configuration. You cannot, of course, delete a device while it is actively in use; for instance, you cannot delete a printer while it is printing or a tty device while it is enabled.

Should you have to remove a device for adjustments or repairs, you do not have to delete it from the system. You can re-attach the device and continue to use it as before.

Showing Device Information

With the **showall** and **showdev** commands, you can display the following:

- A list of all devices configured in your system. (Type **showall**, and press **Enter**.)
- A list of all devices of a particular class. (Type **showdev** and the device class, as in: **showdev printer**).
- Device-dependent information for a device. (Type **showdev** and the device class and name, as in: **showdev printer lp0**).

Using the Devices Commands

The rest of this chapter shows examples of how you can use the **devices** commands. In each case, the box contains steps that apply to any device. If you are somewhat familiar with **devices**, you might use the boxed information as a reminder of the steps involved.

Under the “More Detailed Information” sections, you will find specific examples of using **add**, **change**, **delete**, **showall**, and **showdev**. In addition, you will see the information that displays on the screen, along with an explanation of what the prompts mean and how to answer them.

The first step when using **devices** is to request the DEVICE CUSTOMIZING COMMANDS screen. This list shows you the available options.

To Request Devices

1. Log in to the system.
2. After the system prompt, type **devices**, and press **Enter** to see the DEVICE CUSTOMIZING COMMANDS screen.

Now you can select the command you want to enter. See the examples that follow for specific steps.

Displaying All Devices In Your System

To see a list of all the devices that currently are part of your system, use the **showall** command.

To Display a List of All Devices

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **showall**. Press **Enter**.

> **showall**

2. To return to the DEVICE CUSTOMIZING COMMANDS screen after seeing the list of devices, press **F3**. To print a copy of the list (if your printer is configured and working), press **F4**.

You will see a list of devices similar to the following one. If your system has more devices than one screen can contain, you will see a prompt to continue to the next screen. You go to the next screen by scrolling. Use the **Cursor Up** key to move to a previous screen and the **Cursor Down** key to move to a following screen.

The following devices are configured in your system.
A zero (0) in the Port, Slot, or IODN field indicates
information is not available or not applicable. An
asterisk (*) in the Slot field identifies an expansion
unit slot number.

Name	Type	Class	Adapter	Port	Slot	IODN
hdisk0	hdisk0	disk	disk/disket	0	0	1
lp0	5152	printer	mono/par or megapel/par	2	3	5072
tty0	tty	ttydev	ser/paral adptr	3	4	5073
tty1	tty	ttydev	8-port asyn adptr 1	4	6*	5074
fd0	fd0	diskette	disk/disket	0	0	4

To RETURN to the list of commands, press Enter.
To PRINT this list of devices, press F4.

>

Note: An asterisk (*) in the slot number field indicates that the slot number is located in the expansion unit.

If your printer is configured and working, you can print the list of devices on the screen by pressing **F4**. A summary report is also written to the file **/tmp/CONFIGREPORT** that contains the information on each screen, where you have pressed **F4** during a devices session.

Displaying Information About Specific Devices

To see information about specific devices in your system, use the **showdev** command.

To Display Information About Specific Devices

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **showdev** to display a list of device classes currently configured in your system.

```
> showdev
```

2. To see information about a specific device, type the name of the device class. Press **Enter**. For instance, if you want to see information about a printer, type **printer**.

```
> printer
```

You can combine both steps by typing **showdev printer**.

3. Type the name of a specific device from the list of devices configured in your system. For instance, type the name of a specific printer, such as **lp0**. Then press **Enter** to see the information. If you have a printer that is configured and working, you can print a copy of the list of device information by pressing **F4**.
4. To return to the DEVICE CUSTOMIZING COMMANDS screen, press **F3**.

After you enter the **showdev** command and the name of the device you want to see information about, a list of device names similar to the following appears:

The following devices are available.

Device Name	Description
lp0	IBM PC Graphics Printer (5152)
lp1	IBM Proprinter (4201) on a Serial Port

To RETURN to the list of commands, press F3.
To CHOOSE from the list, type the Device Name and press Enter.

>lp1

After you type the name of the device about which you want information, that information appears.

Name	Description	Current Choice	Possible Choices
fl	Form (page) Length	50	1 - length (in . . .
tm	Top Margin	0	0 - length (in . . .
bm	Bottom Margin	50	1 - length (in . . .
lm	Left Margin	0	0 - width (in . . .
fw	Form Width	80	1 - width (in . . .

To SEE additional items in the list, use the Cursor Down or Cursor Up keys.

To RETURN to the list of commands, press Enter.

To PRINT this device information, press F4.

>

If your printer is configured and working, you can print the list of devices on the screen by pressing **F4**. A summary report is also written to the file **/tmp/CONFIGREPORT** that contains the information on each screen, where you have pressed **F4** during a devices session.

Adding Devices to Your System

To add a device to your system, you use the **add** command. Several examples are included in this section to help you better understand the procedures. These examples include:

- Adding an IBM-defined device with defaults
- Adding an IBM-defined device and changing device information
- Adding an unsupported printer
- Adding a device for the Coprocessor.

Remember, these are typical examples. The lists of device classes, device types, and adapters that you see on your screen may not be exactly the same as those shown in the examples. But the basic procedures are very similar. You need only follow the numbered steps for the example most like the task that you want to perform.

Example: Adding an IBM-Defined Device With Defaults

This first example shows how to add an IBM-defined device to a serial or parallel adapter. Because it is an IBM-defined device, you may not need to change any of the settings (device-dependent information).

To Add an IBM-Defined Device

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **a** to select the **add** command. Then press **Enter**.
2. Type the name of the device class. Then press **Enter**.
3. Type the name of the device type. Then press **Enter**.
4. Type the name of the adapter to which you want to add the device. Then press **Enter**.
5. If requested to do so, supply the requested information for the adapter. Then press **Enter**.
6. Indicate whether you want to display or change predefined device information (printer settings, for example).
7. Verify that you want to add the device by pressing **Enter**.
8. After you receive a message indicating that the device has been added, press **Enter** to return to the DEVICE CUSTOMIZING COMMANDS screen.

More Detailed Information

The following example shows you how to add an IBM 3812 printer to your system:

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **a** to select the **add** command. Then press **Enter**.
> a
2. From the list of device classes, type **printer** as the device class, and press **Enter**.

The following device classes are available.

Device Class	Description
printer	Printer or Plotter
ttydev	Asynchronous Terminal (Any Non-Prntr Device on an Async Port)
lan	Local Area Network
tape	Streaming Tape Drive
coprcdev	Coprocessor Device
floating	Floating Point Accelerator
ptydev	Asynchronous Pseudo-Terminal
adapters	IBM RT Adapters
datalinks	IBM RT Generic Data Links

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Class and press
Enter.

> printer

-
3. The list of printers that is displayed for your system may not exactly match the example shown below. From the list of printers, type **3812** as the name of the printer, and press **Enter**. Remember, if you have all of the information you need, you can combine these steps by typing **a pr 3812**.

The following devices are available.

Device Type Description

5152	IBM PC Graphics Printer (5152)
5182	IBM PC Color Printer (5182)
5201p1	IBM PC Quietwriter Printer (5201) Model 1 on a Parallel Port
5201p2	IBM PC Quietwriter Printer (5201) Model 2 on a Parallel Port
4201s	IBM Proprinter (4201) on a Serial Adapter
4201p	IBM Proprinter (4201) on a Parallel Adapter
3812	IBM Pageprinter (3812)
opp	Other Parallel Printer
osp	Other Serial Printer

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Type and press
Enter.

> 3812

-
4. Type the name of the adapter to which you want to add the 3812 printer (for instance, **sp1**). Then press **Enter**.

The following adapters are available.

Adapter Name	Description
sp1	IBM Ser/Par Adptr, Primary
sp2	IBM Ser/Par Adptr, Alternate

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Adapter Name and press Enter.

> sp1

5. To indicate that you have changed the slot the adapter is in, type **sn 6**. Set **eus** to true to indicate that the adapter is located in the expansion unit. Set **eus** to false to indicate that the adapter is located in the system unit.

Note: Although the slot number is supplied, you can still change it, if desired. If the information is valid, however, press **Enter** to select the indicated settings.

Change any of the following information that does not match your system configuration.

Name	Description	Current Choice	Possible Choices
sn	Slot Number	5	1 - 8
eus	Expansion Unit Slot	false	true, false

To CANCEL and return to the list of commands, press F3.
To CHANGE a current choice, type the Name followed by your new choice (example: **sn 3**) and press Enter.
To COMMIT the changes you have made, press Enter.

> sn 6

6. Type **n** and press **Enter** to accept predefined information. Unless you want to change printer characteristics (such as margin, page length, and so on), all of the device information needed by the system is already set up for you.

All device information for this device has been set
for you.

Do you wish to show or change this information?

yes

no

To CANCEL and return to the list of commands, press F3.
To CHOOSE, type yes or no and press Enter.

> no

-
7. Press **Enter** to add the printer or press **F3** to cancel the request.

To **CANCEL** adding the device, press **F3**.

To **ADD** the device with the current information,
press **Enter**.

>

8. After you receive a message indicating that the printer has been added, press **Enter** to return to the **DEVICE CUSTOMIZING COMMANDS** screen.

The device was added to the system.

Device Name: lp0
Device Type: 3812
Device Class: printer

To **RETURN** to the list of commands, press **Enter**.

The system has assigned a new name to the device. This is the name to use when you issue the **print** command for this device.

Note: The first printer you add is the default printer. If you add additional printers, the order of the printers in the print queue is determined by the order of stanzas in **/etc/config**.

Example: Adding An Asynchronous Terminal

Follow these steps to add an asynchronous terminal (an IBM-defined device) to your system.

To Add an IBM-Defined Device

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **a** to select the **add** command. Then press **Enter**.
2. Type the name of the device class. Then press **Enter**.
3. From the list of devices that you can add, type the name of the device type. Then press **Enter**.
4. Type the name of the adapter to which you want to add the device. Then press **Enter**.
5. If you select a 4-port adapter, indicate which port you will attach the device to. Then press **Enter**.
6. If requested to do so, supply the requested information for the adapter. Then press **Enter**.
7. Type **n** and press **Enter** if you do not want to show and change settings for the device.
8. To verify that you want to add the device, press **Enter**.
9. After receiving a message indicating that the device has been added, press **Enter** to return to the DEVICE CUSTOMIZING COMMANDS screen.

More Detailed Information

The following example shows you how to add an asynchronous terminal to your system:

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **a** to select the **add** command. Then press **Enter**. The system displays a list of devices that you can add to your system. The list you see may differ some from the one shown here.
2. From the list of device classes, type **ttydev** as the device class, and press **Enter**.

The following device classes are available.

Device Class	Description
printer	Printer or Plotter
ttydev	Asynchronous Terminal (Any Non-Prntr Device on an Async Port)
lan	Local Area Network
tape	Streaming Tape Drive
coprcdev	Coprocessor Device
floating	Floating Point Accelerator
ptydev	Asynchronous Pseudo-Terminal
adapters	IBM RT Adapters
datalinks	IBM RT Generic Data Links

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Class and
press Enter.

>ttydev

-
3. On the list of available terminals, type `tty` as the name of the terminal, and press **Enter**. Remember, if you have all of the information you need, you can combine these steps by typing `a ttydev tty`.

The following devices are available.

Device Type	Description
<code>.</code> <code>tty</code>	Asynchronous Terminal (Any Non-Prntr Device on an Async Port)
<code>.</code> <code>.</code>	

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Type and
press Enter.

> `tty`

-
4. Type the name of the adapter to which you want to add the terminal. Then press **Enter**.

The following adapters are available.

Adapter Name	Description
sp1	IBM Ser/Par Adptr, Primary
sp2	IBM Ser/Par Adptr, Alternate
rs232c1	232C, 4-Port Async Adptr-1st
rs422a1	422C, 4-Port Async Adptr-1st
s1	IBM RT Serial Port 1
s2	IBM RT Serial Port 2

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Adapter Name and
press Enter.

> rs232c1

-
5. If you select one of the 4-port adapters, you will be prompted to supply the number of the port to which you are attaching the terminal. You might type **1**, and press **Enter**.

The adapter has the following ports:

Port Number	Description
1	First port
2	Second port
3	Third port
4	Fourth port

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Port Number and
press Enter.

> 1

-
6. Supply the following information unless the default values in **Current Choice** suit your needs. In this example, the current choice is the VT100 terminal. You may want to check the meaning of the keywords, as described in Appendix B, "Keyword Descriptions."

Change any of the following information that does not match your system configuration.

Name	Description	Current Choice	Possible Choices
tt	Terminal Type	VT100	ibm3151, ibm3161. . . .
ae	Automatic Enable	false	true, false, share, delay
sn	Slot Number	5	1 - 8
dvam	Device Attachment Method	0	0 = local 1 = remote (modem)

To CANCEL and return to the list of commands, press F3.
To CHANGE a current choice, type the Name followed by your new choice (example: sn 3) and press Enter.
To COMMIT the changes you have made, press Enter.

> dvam 1

-
7. If you want to change any of the device settings, type **y** and press **Enter**.

Note: The device settings must match the way the terminal is set (parity, bits per character, receive/transmit speed, and so on).

All device information for this device has been set
for you.

Do you wish to show or change this information?

yes

no

To CANCEL and return to the list of commands, press F3.
To CHOOSE, type yes or no and press Enter.

> no

8. Verify that you want to add the terminal with the changes you have made by pressing **Enter**. Or, to cancel the request to add the device, press **F3**.

To CANCEL adding the device, press F3.

To ADD the device with the current information,
press Enter.

>

-
9. After receiving a message indicating that the terminal has been added, press **Enter** to return to the **DEVICE CUSTOMIZING COMMANDS** screen.

The device was added to the system.

Device Name: tty0
Device Type: tty
Device Class: ttydev

To RETURN to the list of commands, press Enter.

Note: To use the tty immediately after adding it, type **penable tty0** after the system prompt. Then press **Enter**.

Example: Adding an Unsupported Printer

With the **devices** commands, you can add an unsupported printer to your system. The procedures are similar to those for adding any other device, but you must supply a little more information.

Follow these steps to add an unsupported printer to your system.

To Add an Unsupported IBM Printer

1. On the DEVICE CUSTOMIZING COMMANDS screen, type the following: a **printer osp**. Then press **Enter**. **osp** stands for **other serial printer**.
2. Type the name of the adapter to which you want to add the printer. Then press **Enter**.
3. Supply the requested parameter information.
4. Indicate whether you want to see or change the settings.
5. Verify that you want to add the printer.
6. When the printer has been added, press **Enter** to return to the DEVICE CUSTOMIZING COMMANDS screen.

Note: If you are attaching a plotter to a 5080 RT Graphics System, see *IBM 5080/RT Graphics System: Operation*.

More Detailed Information

1. From the DEVICE CUSTOMIZING COMMANDS screen, type the following: a
printer osp
> a printer osp
Type osp for other serial printer and opp for other parallel printer.
2. Type the name of the adapter to which you want to add the printer. Then press **Enter**.
The following adapters are available.

Adapter Name	Description
sp1	IBM Ser/Par Adptr, Primary
sp2	IBM Ser/Par Adptr, Alternate
rs232c1	232C, 4-Port Async Adptr-1st
rs422a1	422C, 4-Port Async Adptr-1st
s1	IBM RT Serial Port 1
s2	IBM RT Serial Port 2

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Adapter Name and
press Enter.

> sp2

-
3. As requested, supply the necessary information to complete the parameters for the printer and adapter.

Change any of the following information that does not match your system configuration.

Name	Description	Current Choice	Possible Choices
sn	Slot Number	5	1 - 8
f1	Form (page) Length	50	1 - length (in . . .
.			
.			

To CANCEL and return to the list of commands, press F3.
To CHANGE a current choice, type the Name followed by your new choice (example: sn 3) and press Enter.
To COMMIT the changes you have made, press Enter.

> f1 40

4. Indicate whether you want to see or change other settings.

All device information for the device has been set for you.

Do you wish to show or change this information?

yes
no

To CANCEL and return to the list of commands, press F3.
To CHOOSE, type yes or no and press Enter.

> no

-
5. Verify that you want to add the printer to your system.

To CANCEL adding the device, press F3.

To ADD the device with the current information,
press Enter.

>

6. When the printer has been added, press **Enter** to return to the **DEVICE
CUSTOMIZING COMMANDS** screen.

Example: Adding a Device for the Coprocessor

You can assign certain devices for use by the Personal Computer AT Coprocessor if the Personal Computer AT Coprocessor adapter and licensed program are installed in your system. You can add some devices for use only by the Coprocessor. You can add other devices (such as printers) that can be shared by the Coprocessor. A shareable device, such as a printer, can be used by the standard system or by the Coprocessor. However, both cannot use it at the same time.

To Add Devices to the Coprocessor

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **add**. Then press **Enter**.
2. From the list of available devices, type **coprcdev** as the device class. Then press **Enter**.
3. From the list, type the name of the device (Coprocessor-only or shareable). Then press **Enter**.
4. Indicate whether you want to see or change device information.
5. To verify that you want to add the device for use by the Coprocessor, press **Enter**.
6. After receiving a message indicating that the device has been added, press **Enter** to return to the DEVICE CUSTOMIZING COMMANDS screen.

More Detailed Information

1. From the DEVICE CUSTOMIZING COMMANDS screen, type **a** and press **Enter** to select the **add** command.
2. On the list of device classes, type **coprcdev**, and press **Enter**. The system displays a list of devices that you can add to the Coprocessor.

The following device classes are available.

Device Class	Description
printer	Printer or Plotter
ttydev	Asynchronous Terminal (Any Non-Prntr Device on an Async Port)
lan	Local Area Network
tape	Streaming Tape Drive
coprcdev	Coprocessor Device
floating	Floating Point Accelerator
ptydev	Asynchronous Pseudo-Terminal
adapters	IBM RT Adapters
datalinks	IBM RT Generic Data Links

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Class and press
Enter.

> coprcdev

-
3. From the list of devices, type the name of the device you want to add to the Coprocessor. For instance, you might type `coprcdev0`. Then press **Enter** to see Coprocessor-shareable and Coprocessor-only devices.

The following devices are available.

Device Name	Description
<code>coprcdev0</code>	A Coprocessor-Only Device
<code>coprcdev1</code>	A Coprocessor-Only Device
<code>coprcdev2</code>	A Coprocessor-Only Device
<code>coprcdev3</code>	A Coprocessor-Only Device
<code>lp0</code>	IBM PC Graphics Printer (5152)
<code>lp1</code>	IBM Pageprinter (3812)

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Name and press Enter.

> `coprcdev0`

The system prompts you for other adapter-related information at this point. This information must correspond to the adapter specifications usually supplied in the adapter's technical reference information.

Change any of the following information that does not match your system configuration.

Name	Description	Current Choice	Possible Choices
sn	Slot Number	5	1 - 8
nops	Number of Operations	2	0 - 8
iofl	Input/Output Flag	1	0=Input, 1=Output

To CANCEL and return to the list of commands, press F3.
To CHANGE a current choice, type the Name followed by your new choice (example: sn 3) and press Enter.
To COMMIT the changes you have made, press Enter.

> nops 3

4. Indicate whether you want to see or change device information. If you enter **y**, follow the prompts to supply the necessary information.

All device information for this device has been set for you. Do you wish to show or change this information?

yes
no

To CANCEL and return to the list of commands, press F3.
To CHOOSE, type yes or no and press Enter.

> no

-
5. Verify that you want to add the device for use by the Coprocessor by pressing **Enter**.

To CANCEL adding the device, press F3.

To ADD the device with the current information,
press Enter.

>

6. After receiving a message indicating that the device has been added, press **Enter** to return to the **DEVICE CUSTOMIZING COMMANDS** screen or **F3** to cancel the request.

The device was added to the system.

Device Name: coprcdev

Device Type: coprcdev

Device Class: coprcdev

To return to the list of commands, press Enter.

Changing Information about System Devices

You may want to change the settings (device information) for a device in your system. For instance, you may want to change the margin settings for printing documents. The **change** command lets you change settings for a device already installed in your system.

The following example shows how you might change settings for a typical device. (The lists of device types and device classes shown in the example may not be exactly the same as those you see on your screen.)

To Change Device Information

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **C** if you want to change device information. Then press **Enter**.
2. From the list of available devices, type the device class for which you want to change information. Then press **Enter**.
3. From the list of device names, type the name of the device for which you want to change information. Then press **Enter**.
4. Follow the prompts to change the settings displayed on the screen.
5. Verify that you want to commit the device information by pressing **Enter**.
6. After receiving a message indicating that the device information has changed, press **Enter** to return to the DEVICE CUSTOMIZING COMMANDS screen.

More Detailed Information

The following example shows how you change information about a printer in the system:

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **C** to choose the **change** command. Then press **Enter**.
2. From the list of available device classes, type **printer** as the device class for which you want to change information. Then press **Enter**.

The following device classes are available.

Device Class	Description
printer	Printer or Plotter
ttydev	Asynchronous Terminal (Any Non-Prntr Device on an Async Port)
lan	Local Area Network
.	.
.	.

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Class and
press Enter.

> printer

-
3. From the list of available devices, type in **lp0** as the name of the printer for which you want to change information. Then press **Enter**.

The following devices are available.

Device Name	Description
lp0	IBM PC Graphics Printer (5152)
lp1	IBM Pageprinter (3812)

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Name and
press Enter.

> lp0

4. When the list of settings for printer lp0 is displayed, make the changes that you want. Type the name of the setting, followed by a space and the new choice (which must be one of the choices in the "Possible Choices" column). For example, to change the left margin setting from 0 (current choice) to 5, type **lm 5**. Then press **Enter**. Make changes and press **Enter** until you have changed all settings that you want to change.

Change any of the following information that does not match your system configuration.

Name	Description	Current Choice	Possible Choices
sn	Slot Number	5	1 - 8
fl	Form (page) Length	50	1 - length (in . .)
tm	Top Margin	0	0 - length (in . .)
bm	Bottom Margin	50	1 - length (in . .)
lm	Left Margin	0	0 - width (in . .)
fw	Form Width	80	1 - width (in . .)
.			
.			
.			
pitch	Character Pitch	10	10, 12
.			
.			

To CANCEL and return to the list of commands, press F3.
To CHANGE a current choice, type the Name followed by
your new choice (example: sn 3) and press Enter.
To COMMIT the changes you have made, press Enter.

> lm 5

-
5. Verify (by pressing **Enter**) that the changed choices are accurate and that you want to make the changes take effect. To cancel the changes, press **F3**.

To CANCEL changing the device, press **F3**.

To CAUSE the current choices to take effect, press **Enter**.

>

6. You will see a message indicating that the device information has been changed. Press **Enter** to return to the **DEVICE CUSTOMIZING COMMANDS** screen.

The device information was changed.

Device Name: lp0
Device Type: 5152
Device class: printer

To RETURN to the list of commands, press **Enter**.

>

Note: If you use the **change** option of the **devices** command to change any of the settings for your system devices and you notice that your requested changes are not implemented, perform either of the following steps:

- Issue the following commands:
 - **vrconfig -d <device name>**
 - **vrconfig -a <device name>**where <device name> is the name of the device on which you did the **change**.
Note that **vrconfig -d** will not work if the device is in use.
- Perform a re-IPL of the system after issuing the **shutdown** command.

Deleting Devices from the System

When you decide that you no longer need a certain printer or other device in the system, you must delete that device from the system configuration. To delete a device, you use the **delete** command.

The following steps show you how to delete a typical device from your system:

To Delete a Device

1. From the DEVICE CUSTOMIZING COMMANDS screen, type **delete**. Then press **Enter**.
2. From the list of device classes, type in one of the choices. Then press **Enter**.
3. From the list of devices, type the name of the device you want to delete. Then press **Enter**.
4. To verify that you want to delete the device, press **Enter**.
5. After you receive a message telling you that the device has been deleted, press **Enter** to return to the DEVICE CUSTOMIZING COMMANDS screen.

Note: See the appropriate setup information for instructions on physically removing the device you have just deleted from your system.

More Detailed Information

The following example shows how you delete a device from your system. In this example, you are deleting the printer lp0.

1. On the DEVICE CUSTOMIZING COMMANDS screen, type **delete**. Then press **Enter**.
2. From the list of device classes, type **printer** as the name of the device class you want to delete. Then press **Enter**.

The following device classes are available.

Device Class	Description
printer	Printer or Plotter
ttydev	Asynchronous Terminal (Any Non-Prntr Device on an Async Port)
lan	Local Area Network
tape	Streaming Tape Drive
coprcdev	Coprocessor Device
floating	Floating Point Accelerator
ptydev	Asynchronous Pseudo-Terminal
adapters	IBM RT Adapters
datalinks	IBM RT Generic Data Links

To CANCEL and return to the list of commands, press F3.

To CHOOSE from the list, type the Device Class and
press Enter.

> printer

-
3. From the list of printers available to be deleted, type **lp0** as the name of the printer you want to delete from the system. Then press **Enter**.

The following devices are available.

Device Name	Description
lp0	IBM PC Graphics Printer (5152)
lp1	IBM Pageprinter (3812)
lp2	Other Serial Printer

To CANCEL and return to the list of commands, press F3.
To CHOOSE from the list, type the Device Name and
press Enter.

> lp0

4. Verify that you want to delete the printer by pressing **Enter**.

To CANCEL deleting the device, press F3.
To DELETE the device, press Enter.

>

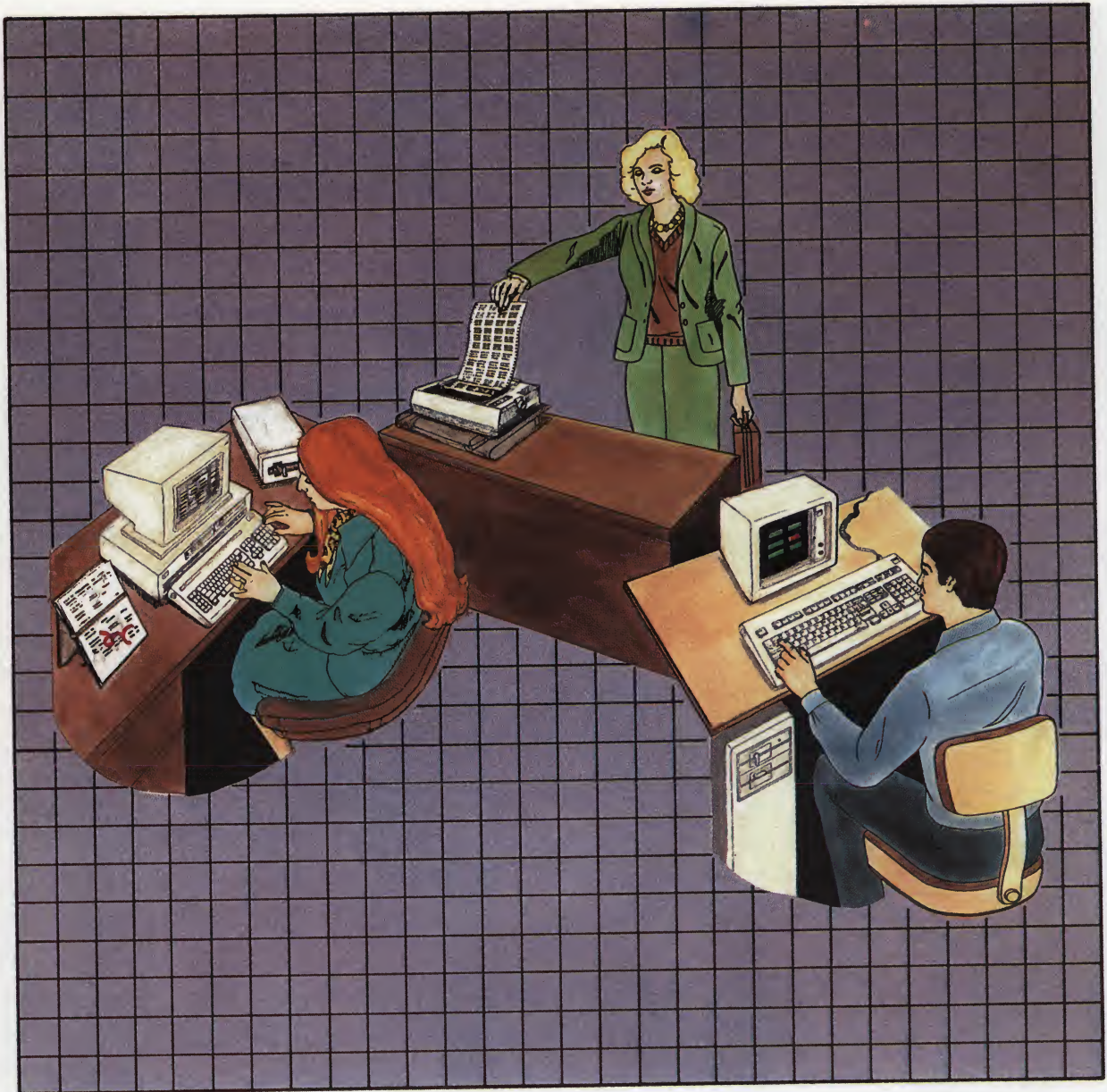
5. After you receive a message telling you that the printer has been deleted, press **Enter** to return to the **DEVICE CUSTOMIZING COMMANDS** screen.

The device was deleted from the system.

Device Name: lp0
Device Type: 5152
Device Class: printer

To RETURN to the list of commands, press Enter.

Chapter 7. Customizing System Minidisks



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About This Chapter

This chapter explains how you can create minidisks (or divisions) on your system fixed disks to contain specific pieces of information necessary for your system to function. If you have installed the AIX Operating System, you already have several minidisks on your fixed disk. These minidisks may be adequate for your system needs.

But if you have installed the Coprocessor or want to create other minidisks, then you must follow instructions in this chapter to create and delete minidisks. This chapter also contains instructions for changing the mount attributes of an existing AIX minidisk and for reaccessing AIX minidisks created with the **minidisks** command (necessary if you reinstall the AIX Operating System) using the replace option.

Note: The **minidisks** command works only for creating or changing user-defined minidisks, not system-created minidisks such as **/**, **/usr**, **/var**, and so on. For system minidisks, use the commands available on the Installation/Maintenance diskette. These commands are described in *Managing the AIX Operating System*.

Learning About Minidisks

Your IBM RT system has up to three internal fixed disks. A fixed disk can be divided into separate areas called minidisks. Each contains information used by the system, and the various minidisks can be different sizes.

A maximum of 64 minidisks can be configured at one time across your system with a limit of 47 minidisks per disk. At this point, you already have several minidisks on your system:

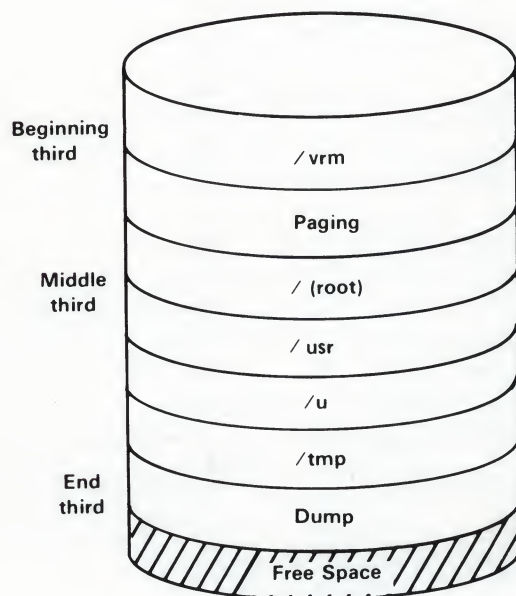
- Two minidisks were created when you installed the AIX Operating System Virtual Resource Manager: the Virtual Resource Manager minidisk and the paging minidisk.
- Other operating system minidisks, which include / (root), /usr, /tmp, /u, and Dump, were created when you installed the rest of the AIX Operating System.

If you need no more than these minidisks, you can use your system without ever using the **minidisks** command. If you have installed the Coprocessor or want to create other minidisks, then you must use the **minidisks** command discussed in this chapter.

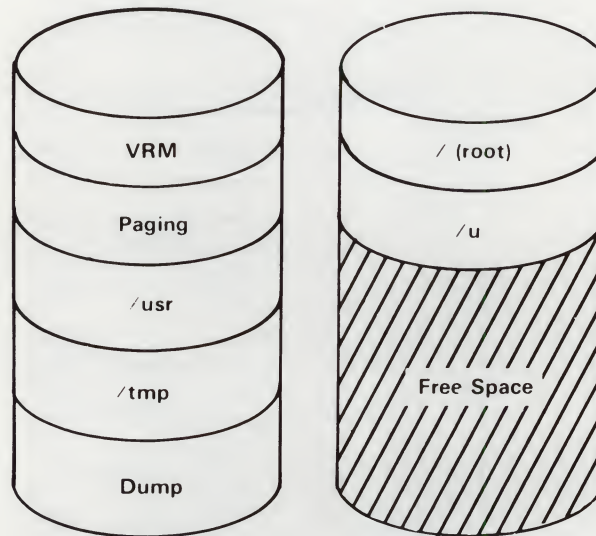
Note: System minidisks can only reside on internal disks.

Warning: If you ever reinstall the AIX Operating System with the replace option (rather than the merge option), remember that doing so automatically destroys the files on all of the operating system minidisks, except for the /u minidisk. See "Reinstalling the Base System Program" on page 4-35 for details.

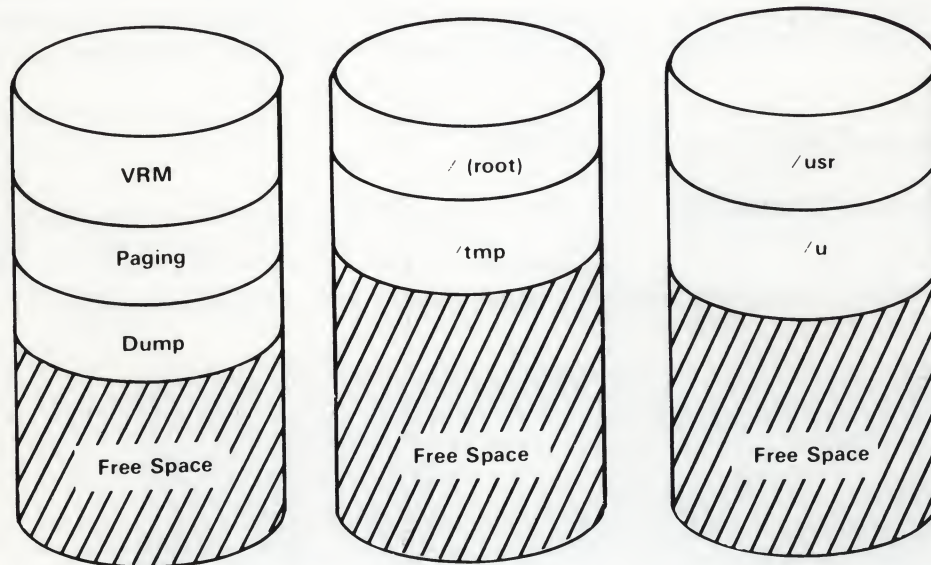
If you have one fixed disk, it probably is partitioned as shown below. While you were installing the AIX Operating System, you may have indicated that you wanted to reserve space on the fixed disk for other programs. If so, there is an area of free space at the end of the disk for you to create a minidisk. Instructions in this chapter explain how to create minidisks, with an example of how to create one for the Coprocessor.



If you have two fixed disks and have installed the AIX Operating System with the recommended choices, then the fixed disks can be divided as shown below. The configuration on your system may differ.



If you have three fixed disks and have installed the AIX Operating System with the recommended choices, then the fixed disks can be divided as shown below. The configuration on your system may differ.



Available free space cannot be used until you create a minidisk from it. You can use the **minidisks** command to create a different minidisk from each area of free space.

If you have added a second or third fixed disk after installing the AIX Operating System, this disk will be one large area of free space. You can create one minidisk for the entire disk or divide it into several minidisks.

Using the Minidisks Command

Now that you better understand the relationship of minidisks to the fixed disks in your system, you can prepare to use the **minidisks** commands (**show**, **add**, **delete**, and **change**). The following sections describe how to use the **minidisks** commands.

Starting and Exiting Minidisks

To start the **minidisks** command, you must first be logged in to the system. In addition, you must have superuser authority or be a member of the system group. After the system prompt, type **minidisks**, and press **Enter**. You will see the MINIDISK CUSTOMIZING COMMANDS screen, and you can begin using any of those commands.

```
MINIDISK CUSTOMIZING COMMANDS

Minidisks commands are:

Command  Description
-----
add      Create a new minidisk
change   Change mount characteristics of an existing minidisk
delete   Delete an existing minidisk
show     Show minidisk information

To EXIT the minidisks command, press F3.

To USE a minidisks command, type the command and press Enter.

>
```

You can exit **minidisks** at any time by pressing **F3** on the keyboard. When you press **F3**, you return to the list of commands. If you press **F3** from the list of commands, you exit **minidisks**. You will see the **\$** or **#** prompt displayed.

Using Abbreviated Commands

To save time, you can abbreviate the **minidisks** commands by typing only the first letter for each command. That is, type **s** for **show**, **a** for **add**, **d** for **delete**, or **c** for **change**. You can also type **y** for **yes** and **n** for **no**. You must spell out in full all minidisk names, directory names, and fixed-disk names.

Using Minidisks Commands

The four **minidisks** commands are:

- **show**
- **add**
- **delete**
- **change.**

The following sections provide information on each command, and you will find examples of how to use each command later in this chapter.

Showing Minidisk Information and Planning Ahead

The **show** command lists all minidisks and areas of free space for all disks configured in your system. Any external disks that are not powered on and configured will be displayed. Also, while you are using the **minidisks** commands, you can see this information by pressing the **F2** key. A line on the screen identifies those times when that information is available. In the example on the next page, **hd0** is the AIX Operating System / (root) file system minidisk, and **hd8** is a minidisk that has been created on free space similar to the remaining area of free space on **hdisk0**. **hd8** is mounted at IPL time on the directory **/usr/hd8**, with read/write access.

If you are planning to create a minidisk, record the following information to use for that procedure:

- Location and number of blocks of the free space area to be partitioned

If the free space spans more than one position, you can request either position and your minidisk will be created such that all of the contiguous space in the requested position is taken, with some overlap on the adjacent position, if necessary. You should specify the beginning or middle position for best results. The space can overlap the beginning and middle positions or the middle and ending positions. But if you specify the ending position, the system cannot create a minidisk that overlaps free space in the middle position.

- Name of the fixed disk.

Note that there are different block sizes. All free space is reported in terms of 512-byte blocks, and most minidisks have a block size of 512 bytes.

Block Size x Number Blocks = Number of Bytes in Minidisk

512	x	5000	=	2,560,000 bytes
1024	x	2500	=	2,560,000 bytes
2048	x	1250	=	2,560,000 bytes

A minidisk of block size 512 having 5000 blocks is the same size as a minidisk of block size 1024 having 2500 blocks, and also the same size as a minidisk of block size 2048 having 1250 blocks.

Because 2048 is four times 512, if you create a minidisk of block size 2048 on an area of free space having 24,000 blocks, you request 24,000 divided by 4, or 6000 blocks.

Note in the following example that minidisk `hd8` and the remaining area of free space on `hdisk0` are the same size. To create a minidisk on the remaining area of free space with a block size of 2048, write down 12500 as the number of blocks to request.

Fixed Disk `hdisk0` has the following minidisks:

MD Name	MD IODN	MD Type	Block Size	Number Blocks	MD Loc	Mount Directory	Auto IPL	Auto Mount	R/W Status
Available Space			512	50000	B	*****			
hd0	16384	AIX	512	10375	B,M,E	/	Y	Y	R/W
hd8	20002	AIX	512	50000	E	/usr/hd8	N	Y	R/W

To CONTINUE, press Enter.

To PRINT this list of minidisks, press F4.

>

Adding Minidisks

Once you decide to add a minidisk, you select **add** from the list of **minidisks** commands. When a line on the screen indicates that you can do so, you can press **F2** to see where the free space is and how large it is. At other times, you can use the **show** command to see this information.

After you enter the **add** command, you must answer a series of questions to help you provide the needed information for the system to add the minidisk. For example, you will be asked to provide the block size, the location on the disk, and other information. These are items that you should have recorded while using the **show** command.

Note: The **add** command will not recognize external disks that are not turned on and configured.

Deleting Minidisks

Once you enter the **delete** command, you will be asked to enter the name of the minidisk you want to delete. Then you will see information about the minidisk and be asked to verify that you want to delete that minidisk.

Warning: When you delete a minidisk, any files on that minidisk are likely to be lost. Be certain to copy any files you want to keep. Otherwise, you can lose valuable information. See *Managing the AIX Operating System* for information about guidelines for backing up your files.

Changing Mount Attributes

With the **change** command, you can make the following changes to AIX minidisks:

- Change the directory on which a minidisk is mounted
- Change whether the minidisk is automatically mounted after it is configured.
- Change whether the minidisk is mounted read-only or read/write.

See *Managing the AIX Operating System* for more information on these topics.

After you enter the **change** command, you will be asked to answer several questions to guide you through steps to change the settings for the minidisk.

Example: Using the Minidisks Command

The rest of this chapter presents several examples to show you how to use the **minidisks** commands. In each case, the box contains steps for the use of the command. If you are somewhat familiar with **minidisks**, you might use the boxed information as a reminder of the steps involved.

Under “More Detailed Information” is information that displays on the screen, along with an explanation of what the prompts mean and how to respond to them.

The first step when using **minidisks** is to request the list of **minidisks** commands. This list shows you the available options.

To Request Minidisks

1. After the `$` or `#` prompt, type `minidisks`.
2. Press **Enter**.

More Detailed Information

1. After the `$` or `#` prompt, type `minidisks`.
`# minidisks`
2. Press **Enter** to see the MINIDISK CUSTOMIZING COMMANDS screen.

```
MINIDISK CUSTOMIZING COMMANDS

Minidisks commands are:

Command  Description
-----  -
add      Create a new minidisk
change   Change mount characteristics of an existing minidisk
delete   Delete an existing minidisk
show     Show minidisk information

To EXIT the minidisks command, press F3.

To USE a minidisks command, type the command and press Enter.

>
```

Example: Displaying Minidisk Information

To display information about existing minidisks, select **show** from the **minidisks** commands screen.

To Display Minidisk Information

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type **show** (or **s**) to see information about minidisks. Press **Enter**.

> **show**

Remember that as you use the **add**, **change**, or **delete** commands, you can display information about disks by pressing **F2**.

2. To return to the MINIDISK CUSTOMIZING COMMANDS screen, press **Enter**.

More Detailed Information

After entering **show** (or **s**) to display information about existing minidisks, you will see a screen similar to this one:

You may show the minidisk information for every fixed disk
or for one disk only.
To CHOOSE from the list, type your choice and press Enter.

hdisk0
hdisk1
all

> **hdisk0**

After entering the name of the fixed disk about which you want to see information, you see minidisk information similar to the following:

Fixed Disk hdisk0 has the following minidisks:

MD	MD	MD	Block	Number	MD	Mount	Auto	Auto	R/W
Name	IODN	Type	Size	Blocks	Loc	Direct	IPL	Mount	Status
Available Space	512		50000	B,M	*****				
hd0	16384	AIX	512	10375	M	/	Y	Y	R/W
Available Space	512		50000	M,E	*****				

To CONTINUE, press Enter.

To PRINT this list of minidisks, press F4.

>

To better understand this information, you may want to review the information about minidisks at the beginning of this chapter.

If you have a printer configured and running, you can print the information you see on the screen by pressing **F4**. A summary report is also written to the file **/tmp/CONFIGREPORT** that contains the information on each show screen, where **F4** has been pressed during the **minidisks** session.

Example: Adding an AIX Minidisk

To add an AIX minidisk to the system and specify characteristics for that minidisk, select **add** from the **minidisks** list. Follow these instructions:

To Add an AIX Minidisk--Part 1

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type **add** (or **a**). Then press **Enter**.
2. After the **>** prompt, indicate that there will be an AIX file system on the minidisk by typing **yes**. Then press **Enter**.
3. Type the full path name of the directory on which the minidisk is to be mounted. Press **Enter**.
4. Indicate whether you want the minidisk mounted after it is configured, and press **Enter**.
5. Indicate whether you want the minidisk to be read-only or read/write. Press **Enter**.
6. Continue with "To Add an AIX Minidisk--Part 2" on page 7-21.

More Detailed Information

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type **add** to indicate that you want to add a minidisk. Press **Enter**.

> add

2. Type **yes** to indicate that you want an AIX file system on the minidisk. Press **Enter**.

Will there be an AIX file system on this minidisk?

yes

no

Type yes or no and press Enter.

> yes

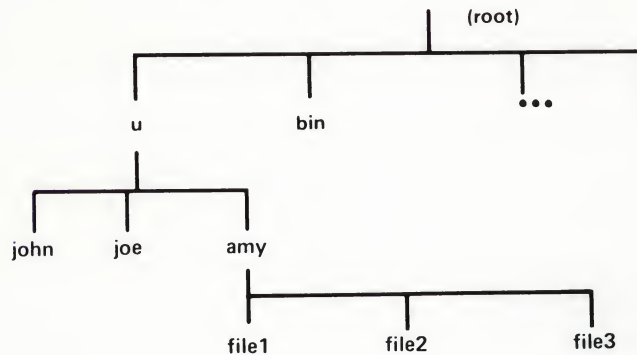
3. Type the full path name of the directory on which to mount the new minidisk, and press **Enter**.

Type the full path name of the directory on which you want to mount this minidisk (example: /usr/mine) and press Enter.

> /u/amy

A full path name begins with the / (root) directory. For example, if your minidisk is to be mounted on /u/amy, the files **file1** and **file2** will have the path names /u/amy/file1 and /u/amy/file2.

The following example depicts how a new minidisk can be mounted on the directory /u/amy:



4. Next, indicate whether you want the new minidisk mounted after it is configured, and press **Enter**.

Do you want this minidisk to be automatically mounted after it is configured?

yes
no

Type yes or no and press Enter.

> yes

Internal disks and the minidisks on them are configured each time you start the system. If the minidisk is automatically mounted each time you start the system, you can access the files stored on the minidisk without using the **mount** command. But if the minidisk is not automatically mounted each time you start up the system, you must use the **mount** command to mount the minidisk before you can access the files on that minidisk.

External disks and the minidisks on them are not configured at IPL time and must be configured with the **varyon** command. If you specify on this screen that the minidisk should be automatically mounted, the **varyon** command will mount it. Otherwise, you must run the **mount** command to access the files on an external minidisk.

5. Now indicate whether you want the minidisk to be read-only or read/write, and press **Enter**.

The following access permissions are available:

Name	Description
rw	read/write
ro	read-only

To choose a permission, type the name and press Enter.

> rw

The minidisk can be mounted with either read-only or read/write access. With read-only access, you only will be able to read files on your minidisk. If you choose the read/write option, you will be able to both read and write to the files on your minidisk.

6. Continue with "To Add an AIX Minidisk--Part 2" on page 7-21.

To Add an AIX Minidisk--Part 2

1. After the `>` prompt, establish the size of the minidisk by typing the number of 512-byte blocks. Press **Enter**.
2. Choose the disk where the new minidisk will be located. Type in the disk name, and press **Enter**.
3. Choose whether you want to place the new minidisk on the next available free space or on a specific disk location. Type `yes` or `no`, and press **Enter**. If `yes` continue with step 4. If `no`, go to step 5.
4. Choose the starting position for the new minidisk (beginning, middle, or end of the fixed disk). After the `>` prompt, type the name of the starting position, and press **Enter**.
5. Review the settings for the new minidisk, and follow directions on the screen to change choices, to cancel the creation of the minidisk, or to create the new minidisk.
6. If the mount directory does not exist, use the **mkdir** command to create it.
7. For an existing minidisk, mount it before you use it. Type: `mount /u/minidisk`. Then press **Enter**.

More Detailed Information

1. After the `>` prompt, establish the size of the minidisk by typing the number of 512-byte blocks. Then press **Enter**.

The block size for AIX minidisks is 512 bytes.
Type the number of blocks for this minidisk and
press **Enter**.

To SHOW minidisk information in requested blocksize,
press F2.

`> 60000`

The number of blocks determines how large your minidisk will be. AIX minidisks have a blocksize of 512-bytes. You can press **F2** for the **show** command at this time. Doing so displays free space in 512 blocks. Note that some of this space (about 5 percent) is used for indexes, not data. See "Showing Minidisk Information and Planning Ahead" on page 7-10.

2. The next screen shows the disk names that are currently configured into the system. Choose the disk where the new minidisk will be located. Type in the disk name, and press **Enter**.

The following fixed disks are available:

hdisk0
hdisk1

Type the fixed disk on which to create this minidisk
and press **Enter**.

To SHOW minidisk information in requested blocksize,
press F2.

`> hdisk0`

There may not be enough free space for a minidisk of the size you have requested on each disk in the list. If you do select a fixed disk without adequate space for your minidisk, you will see an error message and then a summary screen from which you can select a different fixed disk or number of blocks.

-
3. Next, decide whether you want to choose a particular location for your minidisk. Type **yes** or **no**, and press **Enter**. See "Showing Minidisk Information and Planning Ahead" on page 7-10 for guidelines.

If you do not choose a location for this minidisk on the disk, the minidisk will be placed in the first available free space on the disk.

Do you want to choose a location?

yes
no

Type yes or no and press Enter.

To SHOW minidisk information in requested blocksize, press F2.

> yes

-
4. Choose the position for your minidisk from the available locations shown on the screen. In this example, you can select the **middle** or the **end**. Or, if you want, you can select **no preference**. Type **m**, **e**, or **n**, and press **Enter**.

The following positions for this minidisk are available:

Name	Description
m	middle
e	end
n	no preference

To CHOOSE a starting position, type the name and press Enter.

To SHOW minidisk information in requested blocksize, press F2.

> e

-
5. Now you will see a screen summarizing the current choices and any choices you may have indicated that you want to make. You have the option of changing current choices, canceling the creation of this minidisk, or creating the new minidisk with the current choices. If you make any changes, you must verify those changes before the new minidisk is created. You will also be prompted again (see steps 3 and 4) for location on the disk, if the number of blocks is too large for the fixed disk you selected. The following example assumes that the number of blocks will be changed to 50000:

```
Minidisk name:  hd8
Minidisk location:  end
Directory:  /u/amy
Automatic Mount:  yes
Read Permission:  read/write
```

The following information can be changed:

Name	Description	Current Choice	Possible Choices
nob	Number of Blocks	60000	
fd	Fixed Disk	hdisk0	hdisk0,hdisk1, . . .

To CHANGE a current choice, type the name followed by your new choice (example: nob 1000) and press Enter.

To CANCEL creation of this minidisk, press F3.

To CREATE this minidisk with the current choices, press Enter.

To SHOW minidisk information, press F2.

> nob 50000

To make changes, type the name, a space, and the new choice. Then press **Enter**, as shown in the example above. If you change the fixed disk (for example, from **hdisk1** to **hdisk0**), you will be asked to indicate a location on the new fixed disk.

Press **Enter** when you have completed your changes. If you made any changes, you will see the changed choices on the summary screen, as in the following example:

Minidisk name: hd8
Minidisk location: end
Directory: /u/amy
Automatic Mount: yes
Read Permission: read/write

The following information can be changed:

Name	Description	Current Choice	Possible Choices
nob	Number of Blocks	50000	
fd	Fixed Disk	hdisk0	hdisk0,hdisk1, . . .

To **CHANGE** a current choice, type the name followed by your new choice (example: nob 1000) and press **Enter**.

To **CANCEL** creation of this minidisk, press **F3**.

To **CREATE** this minidisk with the current choices, press **Enter**.

To **SHOW** minidisk information, press **F2**.

>

When you press **Enter** without making any changes, the minidisk is added to the system. For large minidisks, this process may take a few minutes. During this time, the minidisk is being defined and the **lost + found** directory is created. The **lost + found** directory is created with N slots for lost files, where N is the total number of i-nodes in the file system divided by 10, with a minimum of 128 and a maximum of 1024 slots.

If you receive a "special processing" error message while the minidisk is being added, see Appendix C, "Special Processing for Devices and Minidisks," for error recovery procedures.

-
6. If the mount directory does not exist, use the **mkdir** command to create it. For more details on **mkdir**, see *AIX Operating System Commands Reference*.
 7. The system displays a message confirming the addition of the new minidisk, then returns to the list of **minidisks** commands.

The minidisk has been successfully created. The minidisk name is hd8.

To CONTINUE, press Enter.

Note: The directory `/u/amy` must exist before you try to mount the minidisk for the first time.

If the directory `/u/amy` does not exist, you must exit **minidisks** and type:

`mkdir /u/amy` (Press **Enter**)

These steps will create the directory `/u/amy`. See *Managing the AIX Operating System* for more information on creating new file systems.

Mount the minidisk before you use it the first time. To do this, type: `mount /u/amy`. Then press **Enter**.

Example: Adding Coprocessor and Non-AIX Minidisks

To use a Coprocessor (if one is installed in your system), you can create a minidisk for the Coprocessor to use. To do so, use the **add** command. Use the following instructions to create a minidisk after installing the Coprocessor:

To Add a Non-AIX Minidisk--Part 1

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type **add** (or **a**). Press **Enter**.
2. After the **>** prompt, type **no** to indicate that there will be no AIX file systems on this minidisk, and press **Enter**.
3. Type **yes** and press **Enter** to indicate that the minidisk will be used by the Coprocessor.
4. Continue with "To Add a Non-AIX Minidisk--Part 2" on page 7-30.

More Detailed Information

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type `add` (or `a`), and press **Enter**.

`> add`

2. After the `>` prompt, type `no` to indicate that you do not want an AIX file system on the minidisk, and press **Enter**.

`Will there be an AIX file system on this minidisk?`

`yes`

`no`

Type `yes` or `no` and press **Enter**.

`> no`

3. To indicate that the new minidisk will be used by the Coprocessor, type `yes`. Press **Enter**.

`Will this minidisk be used by the Coprocessor?`

`yes`

`no`

Type `yes` or `no` and press **Enter**.

`> yes`

You will be asked to indicate whether the new minidisk is to be associated with the Coprocessor only if the Coprocessor is already configured in your system. If you enter `no`, the minidisk is available as a device, but it will not contain an AIX file system.

4. Continue with "To Add a Non-AIX Minidisk--Part 2" on page 7-30.

To Add a Non-AIX Minidisk--Part 2

1. After the **>** prompt, type the number of blocks to give to the minidisk, and press **Enter**.
2. Type the name of the fixed disk on which you want the minidisk, and press **Enter**.
3. To indicate whether you want to choose a location on the disk for the minidisk, type **yes** or **no**. If you enter **yes**, continue with step 4. If **no**, go to step 5.
4. From the list, choose a location on the fixed disk for your minidisk. Type in the location, and press **Enter**.
5. On the summary screen, press **Enter** to add the minidisk. To cancel the add minidisk session, press **F3**. To change any of the displayed settings, enter the setting name and the new choice after the **>** prompt. To add or cancel the minidisk after changes, press **Enter** or **F3**.

More Detailed Information

1. After the **>** prompt, type the number of blocks to give to the minidisk, and press **Enter**.

Type the number of 512 blocks for this minidisk and press **Enter**.

To SHOW minidisk information in requested blocksize, press **F2**.

> 1250

The size of your minidisk (in bytes) is the block size times the number of blocks that you specify now. If you want your minidisk to fit into a certain free space as shown by the **show** command, press **F2**.

You should allocate at least 780 512-byte blocks for a Coprocessor minidisk to run DOS 3.0 or BASIC. More blocks may be required to run other PC applications. Check the documentation for the specific application to determine size requirements.

2. After the **>** prompt, type the name of the fixed disk on which you want the minidisk (as shown in the following), and press **Enter**.

The following fixed disks are available:

hdisk0
hdisk1

Type the fixed disk on which to create this minidisk
and press Enter.

To SHOW minidisk information in requested blocksize,
press F2.

> hdisk0

The screen shows all the fixed disks currently configured in your system. None of the fixed disks listed may have enough free space for a minidisk of the size you want. If you do select a fixed disk without adequate space for your minidisk, you will see an error message and then a summary screen from which you can select a different fixed disk or number of blocks.

-
3. To indicate whether you want to choose a location on the disk for the minidisk, type **yes** or **no**, and press **Enter**. If you enter **no**, go to step 5.

If you do not choose a location for this minidisk on the disk, the minidisk will be placed in the first available free space on the disk.

Do you want to choose a location?

yes
no

Type yes or no and press Enter.

To SHOW minidisk information in requested blocksize, press F2.

> yes

4. Choose a position for your minidisk from the list of available locations. Type b, m, e, or n, and press **Enter**.

The following positions for this minidisk are available:

Name	Description
b	beginning
m	middle
e	end
n	no preference

To CHOOSE a starting position, type the name and press Enter.

To SHOW minidisk information in requested blocksize, press F2.

> e

-
5. On the summary screen, to add the new minidisk, press **Enter**. To cancel the add minidisk session, press **F3**. To change any of the displayed settings, enter the setting name and the new choice after the > prompt. To add or cancel the minidisk after changes, press **Enter** or **F3**.

Minidisk Name: hd7

The following information can be changed:

Name	Description	Current Choice	Possible Choices
nob	Number of Blocks	1250	
fd	Fixed Disk	hdisk0	hdisk0,hdisk1, . . .

To CHANGE a current choice, type the name followed by your new choice (example: nob 1000) and press Enter.

To CANCEL creation of this minidisk, press F3.

To CREATE this minidisk with the current choices, press Enter.

To SHOW minidisk information, press F2.

>

After you press **Enter**, a message indicates that the minidisk has been created:

The minidisk has been successfully created. The minidisk name is hd7.

To CONTINUE, press Enter.

>

Example: Deleting a Minidisk

To delete a minidisk, select the **delete** option from the list of **minidisks** commands.

Note: Be certain to copy any files that you want to save before you delete the minidisk. See *Managing the AIX Operating System* for information on copying files.

To Delete a Minidisk

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type **delete**, and press **Enter**.
2. After the **>** prompt, type the name of the minidisk you want to delete. Press **Enter**.
3. On the summary screen, verify that you want to delete the minidisk by pressing **Enter**. To cancel the deletion process, press **F3**.

More Detailed Information

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type **delete**. Press **Enter**.
> delete
2. After the **>** prompt, type name of the minidisk you want to delete. Press **Enter**.
Type the name of the minidisk you want to delete and
press **Enter**.

To SHOW minidisk information, press **F2**.

> hd8

-
3. On the summary screen, verify that you want to delete the minidisk by pressing **Enter**. To cancel the deletion process, press **F3**.

Minidisk name: hd8
Directory: /u/amy
Automatic Mount: yes
Read Permission: read/write

Name	Description	Current Choice	Possible Choices
nob	Number of Blocks	50000	
fd	Fixed Disk	hdisk0	hdisk0,hdisk1, . . .

WARNING: ALL FILES ON THIS MINIDISK MAY BE DESTROYED

To DELETE this minidisk, press Enter.
To CANCEL deletion of this minidisk, press F3.

>

After the minidisk has been deleted, this message appears:

Minidisk hd8 has been deleted.

To CONTINUE, press Enter.

Note: You cannot delete a minidisk that is in use.

Example: Changing Minidisk Mount Attributes

To change the mount attributes for an existing AIX minidisk, select **change** from the list of **minidisks** commands.

The mount attributes (automount, permissions, and so on) usually are set so that existing minidisks are automatically mounted each time you start up the system. However, if you want to change the attributes of one or more minidisks so that they are not automatically loaded at startup time, you can do so with the **change** command. To change mount attributes, follow these steps:

To Change Mount Attributes

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type **change**. Press **Enter**.
2. After the **>** prompt, type the name of the minidisk you want to change. Press **Enter**.
3. After the **>** prompt, type **yes** or **no** to indicate whether you want to change the directory on which the minidisk is mounted. Then press **Enter**.
4. Type **yes** or **no** to indicate whether you want to change the automatic mount status of the minidisk. Then press **Enter**.
5. Type **yes** or **no** to indicate whether you want to change the read/write status of the minidisk. Then press **Enter**.
6. On the summary screen, press **Enter** to change the mount attributes or press **F3** to cancel the mount process.

More Detailed Information

1. On the MINIDISK CUSTOMIZING COMMANDS screen, type `change` (or `c` or `ch`). Then press **Enter**. This selects the `change mount attributes` option.

`> change`

2. After the `>` prompt, type the name of the minidisk you want to change. Then press **Enter**.

Type the name of the minidisk you want to change and press **Enter**.

To SHOW minidisk information, press F2.

`> hd8`

3. Type `yes` or `no` to indicate whether you want to change the directory on which the minidisk is mounted. Then press **Enter**.

This minidisk is mounted on directory `/u/amy`.

Do you want to change the directory?

`yes`
`no`

Type `yes` or `no` and press **Enter**.

`> no`

-
4. Type **yes** or **no** to indicate whether you want to change the automatic mount status of the minidisk--that is, whether you want the minidisk automatically mounted after it is configured. Then press **Enter**.

This minidisk is automatically mounted after it is configured.

Do you want to change the automatic mount status?

yes

no

Type yes or no and press Enter.

> no

5. Type **yes** or **no** to indicate whether you want to change the read/write status of the minidisk. Then press **Enter**.

This minidisk is mounted with read/write permission.

Do you want to change the mount permission?

yes

no

Type yes or no and press Enter.

> yes

Other Device-Specific Information

The following list contains information specific to certain devices that you will need to know when adding or deleting devices from your system:

- IBM 4201 Proprinter – Changes the **cp** keyword to **MLP** to use the international language fonts.
- IBM 4202 Proprinter – Changes the **cp** keyword to **MLP** to use the international language fonts.
- IBM PC Quietwriter Printer Model 2 – Changes the **big**s keyword to **yes**.
- tty
 - Once the tty is added using **devices**, the **penable** command must be run to enable the tty port before it can be used.
 - To add a remote tty, the **dvam** keyword must be set to 1.
- Personal Computer AT Coprocessor Services Device – Must be attached to a PC-supported adapter (IBM Serial/Parallel Adapter, IBM Mono display/par printer adapter).
- Baseband Adapter
 - If only one Baseband Adapter is being installed, you can usually use the default (factory) memory address setting. This is the setting that the **devices** command assumes, and it supplies default settings for the other three memory addresses that have to be set.
 - If more than one Baseband Adapter is being installed:
 - The first adapter can be installed with default memory address settings, but subsequent adapters cannot as there will be memory address conflicts. You must select a different starting address on the card with the jumper (see *option*) and then supply the other three addresses when you run the **devices** command. These addresses have a precise relationship to each other. This relationship is called their offset; if you know the first address (the one that you set with the jumper), then you can calculate the other three addresses. Offsets are described in *VRM Programming Support*.
 - Each adapter must have a different interrupt level. These interrupt levels are also set with a jumper on the adapter itself. These jumper settings are described in *IBM RT Options Installation*.
 - If an adapter is being installed in a machine that has an IBM RT Personal Computer AT Coprocessor Services card with more than 512K of bus memory dedicated to it, the starting address on the adapter must be set to 98000. The other three addresses are calculated and entered when the **devices** command is run. The starting address must be set even if only one adapter card is being installed.

If a second adapter is installed, set the address with the jumper at 90000. Then, the other addresses must be calculated and entered when the **devices** command is run.

-
- 9332 DASD
 - The IBM 9332 DASD Attachment is a fixed-disk storage unit available in 200-megabyte and 400-megabyte disks. The 400-megabyte disks are actually two 200-megabyte disks under one cover. All AIX commands recognize one 400-megabyte disk as two 200-megabyte disks.
 - A 200-megabyte disk or disks must be added to your system at logical unit number 0 (LUN0) only. For the 400-megabyte disk, the first 200-megabytes must be added at LUN0 only and the second 200-megabytes must be added at LUN1 only. The **lun** keyword must be set to the appropriate value using the **devices** command.
 - The SCSI Controller ID (**sid** keyword) should be set to the same value as the switch on the back of the disk drive. LUN0 and LUN1 of a 400-megabyte disk must have the same **sid** keyword. The **sid** keyword must be set to the appropriate value using the **devices** command.
 - After adding a 9332 disk using the **devices** command, the **varyon** command must first be run to configure the disk and to configure, check, and mount the minidisks on it before it can be used. See *AIX Operating System Commands Reference* for more information on the **varyon** command.
 - Before you delete a 9332 disk, be sure that all minidisks on that disk are unmounted. If any minidisks are still mounted, they will be displayed by the **devices** command and the disk will not be deleted. See *AIX Operating System Commands Reference* for more information on the **umount** command.
 - Note that deleting a disk using the **devices** command does not remove the minidisks or data from the disk. If you would like the disk to be free of data once it is deleted, first delete the minidisks on the disk using the **minidisks (delete)** command. Then, delete the disk using the **devices** command. You can also reformat the disk using the SCSI diagnostic utilities in *Problem Determination Guide*.
 - IBM Megapel Display Adapter
 - This adapter contains a parallel printer port that is equivalent to the parallel port on the IBM Monochrome Display and Printer Adapter. If an IBM Monochrome Display and Printer Adapter already exists on an RT system, you can disable the parallel port on the IBM Megapel Display Adapter. The *IBM RT User Setup Guide* will provide this information for you.
 - Note that when you want to display a list of all devices using the **devices** command shown in “Displaying All Devices In Your System” on page 6-17, the description of either adapter will be shown as **mono/par** or **megapel/par** adapters.
 - Extended ESDI Adapter — The adapters you choose for your system can conflict in two ways: interrupt level or DMA channel. See Appendix E, “Conflicting Adapter Levels,” for more detailed information to help you solve these conflicts.

-
6. On the summary screen, press **Enter** to change the mount attributes. Or press **F3** to cancel.

Current mount characteristics for minidisk hd8.

Minidisk name: hd8

Directory: /u/amy

Automatic Mount: yes

Read Permission: read only

To CANCEL changing the mount characteristics, press F3.

To CAUSE the mount characteristics to take effect,
press Enter.

>

Accessing User-Created Minidisks After Reinstalling (Using the Replace Option)

After reinstalling the AIX Operating System using the replace option, you will not be able to access data on minidisks that you have created using the **minidisks** command. Also, if either the **/etc/system** file or **/etc/filesystems** file is damaged, you may not be able to access data on minidisks that you have created. To regain access to these minidisks, you **must** run the **mdrc** command immediately after reinstalling the AIX Operating System. You must have superuser authority or be a member of the system group to use the **mdrc** command.

The **mdrc** command creates a temporary mount directory if data is not available from **/u/filesystems**, the backup version of **/etc/filesystems**. In this case, **mdrc** creates temporary filesystems entries with an Auto Mount status of "N (No)" and a Read/Write status of "R/W." Run the **minidisks** command with the **change** option discussed in this chapter to give the minidisk the desired Mount Directory, Read/Write status, and Auto Mount characteristics. You may also have to run the **mkdir** command to create a directory if you reinstalled all of the AIX Operating System.

Note: The **mdrc** command will not recognize minidisks that are not configured. Be sure any external disks are powered on and configured with the **varyon** command.

If a minidisk is for use by the Coprocessor and the Coprocessor is not installed when you run the **mdrc** command, run the **mdrc** command again, after installing the Coprocessor licensed program.

See the *AIX Operating System Commands Reference* for more information on the **minidisks**, **mkdir**, **mdrc**, and **varyon** commands.

Appendix A. Enlarging the VRM and Page Space Minidisks

This appendix identifies points you should know when thinking of enlarging the VRM minidisk and the page space minidisk. While there is no specific formula for calculating the optimum minidisk size, after you understand the assumptions you may be better prepared to adjust the size of the minidisks.

This appendix also explains the steps necessary to enlarge the page space minidisk after you have been running the system for a while and have created and deleted other minidisks residing on the same fixed disk.

Note: For additional information, see Chapter 7, “Customizing System Minidisks,” and “Reinstalling the VRM” on page 3-28. For more information on backing up files before you delete minidisks, see *Managing the AIX Operating System*.

Assumptions

The defaults for the Virtual Resource Manager are those that IBM assumes may meet system needs for most users. After using your system for a while, you may decide to change the defaults as you add application programs or work stations.

Keep the following assumptions in mind as you consider changing the size of the VRM minidisk and the page space minidisk:

1. The fact that there can be many jobs and users in a system at the same time complicates the task of trying to calculate the optimum page space size.
2. The disk is a physical device with high storage capacity. But it may seem to have a relatively long data access time. It takes longer to retrieve data from the disk and use it than it does to use data already stored in memory.
3. The performance for an application is usually better when the running of that application requires no paging in or out of the text or data for that application. This arrangement requires a memory size in direct proportion to the memory requirements for the application.
4. For the VRM minidisk, the recommended size is as much space as is needed, unless you intend to install non-IBM code onto the VRM minidisk. If you do install code, you should increase the size of the VRM minidisk by the size of the code. (See the optionally available *VRM Programming Support* for information on developing and installing code on the VRM minidisk.)

Procedures for Enlarging a Minidisk

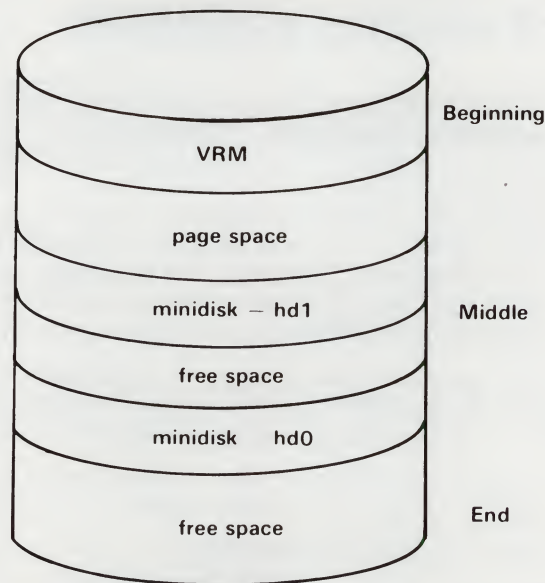
After much activity in creating and deleting minidisks from the fixed disks, the free space on a fixed disk can become fragmented. Fragmented free space consists of several small pieces located at various points on the fixed disk, rather than being packed together in one continuous area. To enlarge the VRM or page space minidisk or to create a new minidisk on a fixed disk, it may sometimes be necessary to rearrange the existing minidisks so that they are all packed together. This arrangement leaves the free space in one contiguous area at the end of the fixed disk. Rearranging minidisks is *not* a simple process, and it can be very time-consuming if you must move large amounts of data from one fixed disk to another. So you probably will want to rearrange minidisks as seldom as possible.

The example in this appendix shows you how to enlarge the page space minidisk when you want to keep it next to the VRM minidisk and when other minidisks exist on the fixed disk. Performance may be enhanced when these two minidisks are kept together.

Although this example relates to the page space minidisk, the principles and techniques usually can be applied whenever you must do any of these steps:

- Change the size of an existing minidisk
- Rearrange the order of the minidisks on a fixed disk
- Combine all free space into one continuous area.

Insert the VRM diskette in drive 0, and press **Ctrl-Alt-Pause**. When the **INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER** menu appears, select item 4 to change only the page space minidisk. The figure on the next page shows what a fixed disk might look like as you prepare to increase the size of the page space minidisk.



If there is not enough contiguous free space on the disk to create a minidisk of the requested size, a message will tell you so. Enough free space for the minidisk may exist.

Performance may be enhanced by placing the VRM and the page space minidisks next to each other and at the beginning of the fixed disk when they are located on the same disk. This is the default positioning when fixed-disk space permits.

Assume that you want to increase page space size and also want to keep the VRM and page space minidisks located at the beginning of the fixed disk. Follow these steps:

1. After returning to the **INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER** menu, remove the VRM diskette from the diskette drive.
2. Insert the Base System Program Installation/Maintenance diskette into the diskette drive, close the drive door, and press **Ctrl-Alt-Pause**.
3. When the **SYSTEM MANAGEMENT** menu appears, choose **Use Maintenance Commands**. (See *Managing the AIX Operating System* for information on the system maintenance commands.)
4. From the **USE MAINTENANCE COMMANDS** menu, choose:
 - a. The option to show minidisk information.

In the example in this section, the minidisks are named **hd0** and **hd1**. But as you use some of the maintenance commands, minidisks are identified by five-digit

numbers in the column “Minidisk IODN” (input-output device number). Unused space is listed as “free space.”

You may find information about the type of minidisk and the number of blocks to be important. You can identify the VRM and the page space minidisks by their type.

- b. The **backup** command option and then the option that lets you do a logical backup of the file systems from minidisks hd0 and hd1 to diskette or tape.

From the list of minidisks that can be backed up, only AIX minidisks can be backed up with this option. If you have a non-AIX minidisk (for example, a Coprocessor minidisk), see related documentation to determine how to back up information from that minidisk.

Note: You can back up and restore AIX Operating System minidisks in other ways. See the last paragraph in this appendix for more information.

Also, there is an option for an image backup of a minidisk that can be used only if you are backing up on tape. One advantage of the image backup is that it can be used for non-AIX minidisks.

- c. The option that lets you delete minidisks hd0 and hd1 from the fixed disk. Remember to note the type of minidisk and the number of blocks for use when you recreate these minidisks.
5. Remove the Installation/Maintenance diskette from the diskette drive. Insert the VRM diskette, close the drive door, and press **Ctrl-Alt-Pause**.
6. From the **INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER** menu, choose item 4 to change the size of the page space minidisk.
7. After creating the new page space, remove the VRM diskette from the diskette drive. Insert the Installation/Maintenance diskette, close the drive door, and press **Ctrl-Alt-Pause**.
8. When the **SYSTEM MANAGEMENT** menu appears, choose **Use Maintenance Commands**.
9. From the **USE MAINTENANCE COMMANDS** menu, choose:
 - a. The option that lets you create a minidisk for the file systems that were on hd0 and hd1. Use the information you saved concerning the type of minidisk and number of blocks.

When you create the minidisk, use the option that lets you choose the minidisk IODN. It is important when you create a new AIX minidisk that it have the same IODN that it had previously. Certain files in the AIX Operating System relate the minidisk IODN to the device name; and if the IODN is incorrect, unpredictable results may occur.

Usually, when you create a minidisk to contain a file system that you have backed up, you use the same number of blocks as were on the minidisk you deleted. But you may want to increase the number of blocks if you know that there is little free space left and that you may add new files to this file system in the future. Or you may want to decrease the number of blocks if you have ample free space available on the minidisk, if you do not plan to add many files to this file system in the future, and if you know that you are running out of free space on your fixed disk.

- b. The option to make a file system on the new minidisks hd0 and hd1.
- c. The **restore** commands option and then the option to restore a file system. You want to restore to minidisks hd0 and hd1 the information backed up on diskette or tape.

You can use this restore procedure only for AIX minidisks. For non-AIX minidisks, see related documentation to determine how to restore information to the new minidisk. Also, you may need to use the **mdrc** command to reaccess user-created minidisks. For more information, see "Accessing User-Created Minidisks After Reinstalling (Using the Replace Option)" on page 7-40.

10. Remove the Installation/Maintenance diskette from the diskette drive. Press **Ctrl-Alt-Pause** to load the system from the fixed disk.

The backup and restore functions, as well as the creation and deletion of minidisks, can also be done in other ways:

- Through the AIX shell and the **backup** and **restore** commands (see *AIX Operating System Commands Reference*)
- Through the **minidisks** command (only for user-created minidisks). See Chapter 7, "Customizing System Minidisks," for information on using the **minidisks** command.
- Through the options on the Installation/Maintenance diskette (for system-generated minidisks).

Appendix B. Keyword Descriptions

Some of the keywords described in this appendix appear on your display screen as you use the **devices** command. Reading the description may help you understand the meaning of the keyword and the parameter to which it refers. For information about keywords not shown in this appendix, refer to *AIX Operating System Technical Reference*.

Adapters

Key Word	Description	Possible Choices
cn	Channel Number: Refers to DMA channel number.	0 - 9
eus	Expansion Unit Slot: Refers to whether the slot number is located in an expansion unit.	true, false
il1	Interrupt Level Number of First Interrupt: Refers to hardware adapter interrupt levels 1 through 4.	10
pn	Port Number on Adapter: Refers to hardware adapter port.	0 - 3
sn	Slot Number: Refers to the slot in which an adapter is installed.	1 - 8

Datalinks

Key Word	Description	Possible Choices
devname	Adapter Device Name: Refers to the device name of the adapter for data link control.	token0, token1, mpd0, mpd1, mpd2, mpd3, net0, net1

Fonts

You can select any of the fonts or print typestyles included on the font diskette. You must type the name of the font and the typestyle exactly as they appear on the diskette.

IBM 5201 Quietwriter

Key Word	Description	Possible Choices
cp1	Code Page 1	PC, A, B, C, D
fnt1	Font 1	
pitch1	Character Pitch 1	
type1	Typestyle 1	

IBM Proprinter (4201)

Four different sets of values are available for the IBM 4201 Proprinter (character pitch 1-4 and code page 1-4). Each set contains a designation for character pitch and code page. The possible choices for each of the four sets are shown below.

The code page choices for the IBM 4201 are the **PC** or multilingual code page (**MLP**). The **PC** code page contains the standard U.S. English alphabet, symbols, and punctuation marks. The **MLP** code page contains characters, symbols, and punctuation marks from many alphabets and languages.

Key Word	Description	Possible Choices
cp1	Code Page 1	PC, MLP
pitch	Character Pitch	10, 12

IBM Pageprinter (3812)

Eight different sets of values are available for the IBM 3812 Pageprinter (font 1-8, type 1-8, character pitch 1-8, code page 1-8). Each set contains a designation for font, typestyle, character pitch, and code page. The possible choices for each of the eight sets are similar.

For the number in each of the keywords and descriptions below, substitute a different number to indicate another of the eight choices. You might, for instance, see fnt2, type2, pitch2, and cp2 for the second set of values.

Key Word	Description	Possible Choices
cp1	Code Page 1	P0, P1, P2, ASCII
fnt1	Font 1	
pitch1	Character Pitch 1	10, 12, 15
type1	Typestyle 1	

Minidisks

Key Word	Description	Possible Choices
bs	Block Size: Refers to the size of sectors of storage on the fixed disk; changes in number of blocks on minidisks may affect system performance.	512, 1024, 2048
fd	Fixed Disk: Refers to the circular plates used for storing data.	hdisk0, hdisk1, ...
nob	Number of Blocks: Refers to the number of blocks in a minidisk.	

Printers and Plotters

Keywords followed by an asterisk (*) can be changed only when adding or changing information about a non-IBM printer.

Key Word	Description	Possible Choices
ars*	Aspect Ratio Support: Does the printer have a "Set Aspect Ratio" control?	yes, no
backs*	Backspace Support: Does the printer have the ability to backspace (move print head backward while printing a line)?	yes, no
big	Bit-Image Graphics Support: Does the printer have bit image graphics controls?	yes, no
bm	Bottom Margin (last line): Refers to last line of text at bottom of a page; for instance, to leave a one-inch bottom margin on a page 66 lines long, you might set the margin on line 60. The value is determined by multiplying the length of the page in inches by the number of lines per inch.	1 - [length(in.) x lines/in.]
cdp	Condensed Print: Should a file be printed with condensed print?	yes, no
colp*	Color Printer: Is the printer capable of printing in color?	yes, no
cps*	Condensed Print Support: Does the printer support printing in condensed characters?	yes, no

Key Word	Description	Possible Choices
cr	Color Ribbon: Is the printer capable of using a color ribbon?	yes, no
cs	Character Set: Refers to the specific character set to be used for printing.	1, 2
cus*	Continuous Underscore Support: Is the printer capable of underscoring characters?	yes, no
dpc	Default Print Color: Refers to the color to use for printing when a file does not contain codes that specify a color: usually black, blue, red, or yellow.	black, blue, red, yellow
dsp	Double Strike Print: Should double-strike be turned on?	yes, no
dsps*	Double Strike Print Support: Does the printer have a control to double-strike characters and provide boldface?	yes, no
dwp	Double Width Print: Should a file be printed with a double-width character set?	yes, no
dwps*	Double Width Print Support: Does the printer have the ability to print with a double-width character set?	yes, no
ep	Emphasized Print: Should emphasized print be turned on? Every character is overstruck with a second pass of the print head.	yes, no

Key Word	Description	Possible Choices
eps*	Emphasized Print Support: Does the printer have a control to do emphasized print?	yes, no
fl	Form (page) Length: Refers to the length of the paper in terms of the number of lines per page. The value is determined by multiplying the length of paper (in inches) by the number of lines printed per inch.	1 - [length (in.) x lines/in.]
fw	Form Width (right margin): Refers to the width of paper in terms of the number of characters per line. The value is determined by multiplying the width of the paper (in inches) by the number of characters printed per inch).	1 - [width(in.) x pitch]
hsi*	Horizontal Spacing Increment: What horizontal increment is used in the ESC K control?	60, 70
hts*	Horizontal Tab Support: Does the printer have horizontal tab controls?	yes, no
js*	Justification Support: Does the printer support an even right margin?	yes, no
kpoe	Keep Printing on Error: Should the printer complete the print job despite errors (without sending an error message to the user)?	yes, no
lm	Left Margin: Refers to the area on a page between the left edge and the leftmost character position on the page.	0 - [width(in.) x pitch]

Key Word	Description	Possible Choices
lpi	Lines Per Inch: Refers to the number of print lines per inch, to line spacing density, and to the distance paper moves during a line feed.	6, 8
lrnc*	Left/Right Margin Controls: Does the printer have the ability to change left and right margins (does it have left and right margin control codes)?	yes, no
mccs*	Multibyte Control Code Support: Does the printer support IBM/OEM multibyte controls? Or does the printer act like an Epson (5152)?	yes, no
pacs*	Print All Characters Support: Does the printer support ESC and ESC- controls?	yes, no
ph	Paper Handling: Refers to the ways the printer handles different types of paper. The manual-feed printer stops at the end of each page and waits for the user to insert another sheet and press the start button. A printer with an automatic sheet-feed mechanism feeds paper to the printer.	0 = manual; 1 = automatic; 2 = continuous (continuous form paper)
pitch	Character Pitch: Refers to the number of characters per linear inch; for instance, 10-pitch type has 10 characters per inch.	10, 12, 15
pq	Print Quality: May select (on some printers) degrees of print quality: dp (for fast, low quality), text (for better draft quality), letter (for high-quality final text).	dp, text, letter

Key Word	Description	Possible Choices
prin	<p>Printer Type: 0 = unspecified (functionally 5152); 1 = 5152; 2 = 5182; 3 = 3812; 4 = 5201; 5 = 4201; 6 = 4202; 7 = 3852; 8 = 5202</p> <p>Note: Changing the prin parameter values in the printer configuration file is not recommended since it can cause the creation of invalid filenames.</p>	0, 1, 2, 3, 4, 5, 6, 7, 8
psd	<p>Paper Source Drawer: Refers to the location of the paper drawer from which paper is drawn for printing.</p>	1 = top; 2 = bottom
pss*	<p>Proportional Spacing Support: Does the printer support proportionally spaced printing?</p>	yes, no
rlfs*	<p>Reverse Line Feed Support: Does the printer support the ESC J control?</p>	yes, no
rtrig	<p>Receive Buffer Trigger: If the buffer has receive data buffering capability, this field selects the number of bytes that will trigger a received data interrupt.</p>	1, 4, 8, 14
slap	<p>Skip Lines at Perforation: Refers to the number of lines skipped at page breaks. The number is divided by 2, so that half the blank lines appear at the bottom of one page and half at the top of the next.</p>	0-[length(in.) x lines/in.]
sss*	<p>Superscript/Subscript Support: Does the printer have the ability to print in superscript and subscript mode?</p>	yes, no

Key Word	Description	Possible Choices
tbc	Transmit Buffer Control: Number of bytes to buffer for transmitter.	0x00 - 0x10
tm	Top Margin: Refers to the number of lines to be skipped at the top of a page before printing begins. If the user specifies 6 lines, the first print line will be line 7. The value is determined by the length of paper (in inches) multiplied by the number of lines per inch.	0 - [length(in.) x lines/in.]
urpim	User to Receive Printer Intervention Messages: Refers to whether printer intervention messages are sent to any valid user or to the user who queued the print job.	Any user ID, pjo = Print Job Owner
vhs*	Variable Horizontal Spacing: Does the printer have ESC d and ESC e controls?	yes, no
vpqs*	Variable Print Quality Support: Does the printer have the ability to print different degrees of quality?	yes, no
vsi*	Vertical Spacing Increment: Refers to parts of inch supported in ESC J and ESC 3 control.	216, 144
vts*	Vertical Tab Support: Does the printer support vertical tabs?	yes, no
will	Wrap Long Lines: Does the printer "wrap" lines? That is, will it break at the right margin those lines longer than specified form width and print the remainder on the next line?	yes, no

Key Word	Description	Possible Choices
12ps*	12 Pitch Support: Does the printer support the printing of 12 characters per inch?	yes, no

Small Computer Systems Interface (SCSI) Devices

Key Word	Description	Possible Choices
ds	Disk Size	200, 400
lun	Logical Unit Number: The number associated with an addressable physical or logical device.	0 - 7
nnfst	No Negotiate for Synchronous Transfers: Refers to whether the device negotiates for synchronous transfers.	true, false
noabb	Number of Allowed Bad Blocks	
nobub	Number of 256-Byte Units/Block: Number of 256-byte units on each block.	
nospt	Number of Sectors per Track	
pdt	Peripheral Device Type	printer, tape, disk, CD-ROM, WO
sid	SCSI ID: Refers to the SCSI ID number.	0 - 6

Tty or Pty Devices

Key Word	Description	Possible Choices
aa	Automatic Answering: Specifies whether the device supports communication auto answering. If the aa keyword is false and the protocol is dc or dtr, data terminal ready and request to send are raised when the port is opened. If aa is true and the protocol is dc or dtr, only dtr is raised until ring indicate is detected, at which time rts is raised.	true, false
ae	Automatic Enable: Refers to the method by which a port is automatically enabled at system start time. When ae is true, the port is enabled when the system is restarted. When ae is false, the port is disabled. When set to share or delay, the port is enabled, with the proper locking to permit outgoing calls to originate from the RT system.	true = enabled; false = not enabled For tty devices only: share = shared/bidirectional use; delay = delay logon herald
bpc	Bits Per Character: Refers to the number of bits per characters used to transmit data from the RT system to the terminal or modem. This keyword is usually set to 7 or 8 and must match whatever the terminal or modem is set up to use. International Character Support requires a bpc value of 8.	5, 6, 7, 8
dvam	Device Attachment Method: Refers to whether the device is attached locally with a cable or connected remotely through a modem. Opens to remotely attached devices do not complete until the Carrier Detect, Clear to Send, and Data Set Ready signals are all set. Local devices, however, can be opened regardless of the setting of these signals.	0 = local; 1 = remote (modem)

Key Word	Description	Possible Choices
ixp	Include Xon/Xoff Protocol: Refers to whether communication protocol includes Xon/Xoff flow control. When ixp is set to false, the protocol is not included. When set to true, Xon/Xoff flow control is used on both the received and transmitted data streams. The values of the roffv , ronv , toffv , and tonv keywords determine the actual characters that are used to implement flow control.	true, false
logger	Pty Supports Login Shell: Refers to whether the pty device supports a login shell. When set to true, the stanza for this pty is put into the /etc/ports file, which allows the port to be enabled and disabled.	true, false
nosb	Number of Stop Bits: Refers to the number of stop bits used to frame each data character transmitted. The value chosen must be compatible with the setting of the bpc keyword. The value 1.5 can only be used for this keyword when the bpc keyword is set to 5.	1, 1.5, 2
om	Operation Mode: Refers to which communications operation mode is set. When set to half, half-duplex communication occurs using the modem control lines. This keyword is usually set to full, which allows data to flow in and out of the system at the same time.	full, half

Key Word	Description	Possible Choices
pro	<p>Protocol: Refers to communication protocol, which determines how the modem control lines are used during a communications session. The pro keyword is generally set to dtr. The dc (Direct Connect) value allows attachment of devices that use hard-wired flow control.</p> <p>Note: While hard-wired flow control is sometimes referred to as DTR pacing, the pro keyword must be set to dc to support this function.</p> <p>When the pro keyword is set to cdstl and the aa (auto answer) keyword is set to true, the modem must send a Data Set Ready signal before the Data Terminal Ready signal is sent back to the modem.</p>	dtr , cdstl , dc
pt	<p>Parity Type: Refers to communication character parity, if any, that the transmitted data has. Received data is checked to ensure the proper parity. The parity types <i>mark</i> and <i>space</i> are not supported by the serial ports on the system board of the Model 6150.</p>	even , odd , mark , space , none
roffv	<p>Receive Xoff Value: Refers to the character sent by the RT system to instruct the remote device to cease sending data (when the ixp keyword is true). This value is usually set to 0x13.</p>	0-ff
ronv	<p>Receive Xon Value: Refers to the character sent by the RT system to instruct the remote device to resume sending data (when the ixp keyword is true). The value is usually set to 0x11.</p>	0-ff

Key Word	Description	Possible Choices
rtrig	Receive Buffer Trigger: If the buffer has receive data buffering capability, this field selects the number of bytes that should be accumulated before the adapter interrupts the processor. This value is not used by the serial ports on the system board of the model 6150.	1, 4, 8, 14
rts	Receive/Transmit Speed: Refers to the communication baud rate.	50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200
sn	Slot Number: Refers to the slot in which the adapter is installed.	1 - 8
sns	Switched/Nonswitched: Refers to the state of the communication line connection. A value of true indicates that the connection uses a switched phone network.	true = switched; false = nonswitched
tbc	Transmit Buffer Control: Refers to the maximum number of characters to be buffered on the adapter for transmission. Some devices can be overrun if this value is too high, since transmission of data staged at the adapter cannot be halted.	0x00 - 0x10
toffv	Transmit Xoff Value: Specifies a character against which all incoming data is compared. If the ixp keyword is true and this character is received, the RT system stops transmitting as soon as possible. The value is usually set to 0x13.	0x00-0xFF

Key Word	Description	Possible Choices
tonv	Transmit Xon Value: Specifies a character against which all incoming data is compared. If the ixp keyword is true and this character is received, the RT system resumes sending data. This value is usually set to 0x11. The value 0xFF for the tonv keyword indicates that any character received after the toffv character should be interpreted as a tonv character.	0x00-0xFF
tt	Terminal Type: Refers to the type of device attached.	

Appendix C. Special Processing for Devices and Minidisks

While adding or deleting certain devices or adding minidisks, you may receive a message that *special processing* has failed. Special processing automatically makes appropriate changes in the files when a printer, a tty, a pty device, a streaming tape drive, a floating-point adapter card, or other device is either added to or deleted from the system configuration through the **devices** command or when a minidisk is added.

When a system user has inadvertently edited certain files, a message on the display screen may indicate that processing has failed. Then you must edit the files to make the necessary changes. The **devices** command has already added the device to the system, but that device is not usable until you make changes in the files. For directions on editing files, see *Managing the AIX Operating System* and *IBM RT INed*.

Devices

Should you receive a message that special processing for devices has failed, read the following sections to determine what action to take.

Printer or Plotter

When a printer or plotter is added, a new print queue (with the same name as the printer or plotter) is created. For example, the first printer added to the system is assigned the name **lp0**, and the queue associated with that printer is also assigned the name **lp0**. You can print jobs on the printer by using the command **print lp0 filename**. This printer/queue association is established by updating the */etc/qconfig* file. In addition, the special processing routine issues the **print -rr** command to activate the new print queue. (When the printer is deleted through the **devices** command, the queue is also deleted.) For more information on the format of the */etc/qconfig* file, see *AIX Operating System Technical Reference*.

When special processing fails, take these actions to add or delete a printer.

Adding a Printer or Plotter

Edit the */etc/qconfig* file to add a new queue for the printer. You must add two stanzas to the file, one for the queue and one for the printer. For example, add the following stanzas to the */etc/qconfig* file to add a printer:

```
lp0:
    argname = lp0
    device = dlp0

dlp0:
    file = /dev/lp0
    backend = /usr/lpd/piobe -pname=name -device=dname
    -profile=/etc/ddi/dfilename -statusfile
```

where,

- *name* is the name of lp#.
- *dname* is the ddi stanza name. You can find this name by looking at the lp0 stanza in the */etc/system* file and getting the value of the keyword **use**.
- *dfilename* is the ddi file name. You can find this name by looking at the lp0 stanza in the */etc/system* file and getting the value of the **ddi_file** keyword.

Add the following stanzas to the */etc/qconfig* file to add a plotter:

```
lp1:
    argname = lp1
    device = dlp1

dlp1:
    file = /dev/lp1
    backend = /usr/lpd/piobe -statusfile -pname=name -plot
```

Deleting a Printer or Plotter

Edit the **/etc/qconfig** file to delete the queue associated with the plotter or printer that you deleted. You must delete two stanzas from **/etc/qconfig**, the queue stanza and the device stanza. For example, delete stanzas lp0 and dlp0 from the **/etc/qconfig** file.

pty

When a new pty device is added, a new entry is made in the **/etc/systems** file for the controller side (ptc) of the pty device and the server side (pts) of the device. Special processing involves only the controller side (ptc). When a pty device is deleted with the **devices** command, the special processing routine removes the ptc entry from **/etc/system**.

When a new pty device is added to the system and the **logger** keyword is set to **true**, a new entry is made in the **/etc/ports** file for the pty device. Information about the terminal type, parity type, bits per character, number of stop bits, herald, location, and choice of whether the pty is to be automatically enabled during system start is copied from the device information file to the new entry in **/etc/ports**. The new entry sets the pty's characteristics when the pty device is enabled. When the pty is deleted through the **devices** command, the entry in **/etc/ports** is also deleted. For information about the format of the **/etc/ports** file, see *AIX Operating System Technical Reference*.

To perform special processing when adding or deleting a pty device, take the following actions.

Adding a pty Device

Edit the **/etc/system** file to add a new entry for the controller side of the pty device. You may also have to add an entry in **/etc/ports** for the device. You must add one stanza to the **/etc/system** file. For example, if pts0 is added to the system but special processing fails, add the following stanza to the **/etc/system** file:

```
ptc0:
    driver = uptc
    minor  = c0
    modes  = rw-rw-rw-
```

Note that the **minor** keyword value is **c** followed by the pty number.

Each pty device has a stanza associated with that device in the **/etc/ddi/pty** file. Each stanza contains a **logger** keyword. If the **logger** keyword is not present in the pty device's stanza, the pty device uses the **logger** keyword from the default stanza. If **logger** = **true** for the pty device, you must edit the **/etc/ports** file, adding a new stanza for the pty device. For example, if pts0 is added to the system but special processing fails and **logger** = **true**, add the following stanza to **/etc/ports**:

```
/dev/pts0 :
loc = "pts0"
term = tt
parity = pt
enabled = true/false
logmodes = (see below)
herald = "IBM RT
          Advanced Interactive Executive Operating System
          \r\nxxxXxxxx(c)
          Copyright IBM Corp. 1985,1988\r\n
          (/dev/pts0)\r\nlogin:
```

where:

- *term* is the terminal type that was specified when the pty was added with **devices**. It is the value entered for the keyword **tt**.
- *parity* is the parity specified when you added the pty device with the **devices** command. Its corresponding value in the ddi file is "pt," shown on the left below. The value on the right is in the **/etc/ports** file. The values map as follows:

```
pt even  --> parity even
pt odd   --> parity odd
pt none  --> parity none
pt space --> parity space
pt mark  --> parity mark
```

Note: The parity types *mark* and *space* are not supported in AIX. Their default value for terminals is None.

- *enabled* refers to whether you want the terminal functional when you start the system. Choose either true or false. If you choose false, you must use the **penable** command to enable the terminal.
- *logmodes* consists of three parts: **echoe+CSNSTOP** These parts are defined as follows:
 - **echoe** is part of all logmodes for a pty device.

-
- CSN is determined by the **bpc** value in the device's ddi stanza:
bpc = 5 --> cs5
bpc = 6 --> cs6
bpc = 7 --> cs7
bpc = 8 --> cs8
 - STOP is determined by the **nosb** value in the device's ddi stanza:
nosb = 1 --> -cstopb
nosb = 1.5 --> -cstopb
nosb = 2 --> +cstopb

For example, a pty device with **bpc = 8** and **nosb = 2** has **logmodes = echoe+cs8+cstopb**.

Deleting a pty Device

Edit the **/etc/system** file to delete the ptc stanza associated with the pty device. You must delete one stanza from **/etc/system**. If there is a corresponding entry in **/etc/ports** for the entry you deleted from **/etc/system**, edit **/etc/ports** to delete the corresponding entry. For example, if pts3 is deleted from the system but special processing fails, delete stanza ptc3 from the **/etc/system** file and delete stanza pts3 from **/etc/ports**.

Adding or Deleting a tty Device

When a new tty is added, a new entry is made in the **/etc/ports** file for the tty. Information about the terminal type, receive/transmit speed, parity type, bits per character, number of stop bits, and choice of whether the tty is to be automatically enabled during system start is copied from the device information file to the new entry in **/etc/ports**. The new entry sets the tty's characteristics when the tty is enabled. When the tty is deleted through the **devices** command, the entry in **/etc/ports** is also deleted. For information about the format of the **/etc/ports** file, see *AIX Operating System Technical Reference*.

Take these actions to do special processing when adding or deleting a tty.

Adding a Terminal

Edit the **/etc/ports** file to add a new entry for the tty. You must add one stanza to the file. For example, if tty0 is added to the system but special processing fails, add the following stanza to the **/etc/ports** file:

```
/dev/tty0:
    term = tt
    enabled = (see below)
    speed = rts
    logmodes = (see below)
    parity = pt
```

where,

- *term* is the terminal type that was specified when the tty was added with the program devices. It is the value entered for the keyword **tt**.
- *enabled* refers to whether you want the terminal functional when you start the system. Choose true, false, share, or delay. If you choose false, you must use the **penable** command to enable the terminal. For additional information about these values, see *AIX Operating System Technical Reference*.
- *speed* is the receive/transmit speed specified when you added the terminal with the **devices** command. It is the value for the keyword **rts**.
- *logmodes* can contain multiple values, but at least two of those values are always the bits per character and number of stop bits. Special processing maps these two values from the ddi file, where the corresponding keywords are **bpc** and **nosb**. The logmode value is divided into two parts: **logmodes = bpc** and **nosb**, with no space between them. It maps as follows:

```
logmode = ixon+echoe+cs8 + cstopb+hupcl
```

```
nosb 1    --> -cstopb
nosb 1.5  --> -cstopb
nosb 2    --> +cstopb
```

```
bpc 5 --> cs5
bpc 6 --> cs6
bpc 7 --> cs7
bpc 8 --> cs8
```

- *parity* is the parity specified when you added the terminal with the **devices** command. Its corresponding value in the ddi file is "pt," shown on the left below. The value on the right is in the **/etc/ports** file. The values map as follows:

VRM Device Driver Diskette

The VRM Device Driver diskette contains additional operating system software components, including device drivers, data link controls, and diagnostic software, for optional adapters and licensed programs.

These components can be installed individually or by adapter card group. If you install by adapter card group, the appropriate device driver and any associated software on this diskette will be installed automatically. You can install one, several, or all adapter card groups at one time. If you install by adapter card group, more than one device driver may be installed. The following table shows which components will be installed for each adapter card group:

Adapter Card Group	Components Installed
RT 3278/79 Emulation Adapter	3278/79 DFT VRM Device Driver 3270 AIX Device Driver
RT Baseband Adapter	Baseband VRM Device Driver Standard Baseband DLC Block I/O AIX Device Driver
RT Multiprotocol Adapter	MPDP VRM Device Driver plus Microcode SDLC DLC 3270 AIX Device Driver Block I/O AIX Device Driver
RT SCSI Adapter	SCSI VRM Device Driver
RT Token-Ring Adapter	Token-Ring VRM Device Driver Token-Ring Diagnostics Token-Ring DLC Block I/O AIX Device Driver

If you do not need the entire program, you can save minidisk space for other uses by selecting and installing only those components you need. The programs you install will depend on the hardware adapters and communications protocols you want to use.

Note: The IEEE Baseband DLC is installable from the individual device driver menu. IBM does not currently provide an IEEE 802.3 baseband adapter card or IEEE 802.3 device driver software.

These are the separately installable components:

- 3270 AIX Device Driver — Provides the AIX device drivers for the NETWORK 3270-PLUS (BSC) and NETWORK RJE-PLUS (BSC).
- 3278/79 Distributed Function Terminal (DFT) VRM Device Driver — Provides the AIX block I/O device driver that controls the 3278/79 emulation advanced adapter.
- Baseband VRM Device Driver — Provides the VRM block I/O device driver that controls the baseband adapter for use with Ethernet.
- Block I/O AIX Device Driver — Provides a kernel device driver interface to VRM block I/O device drivers.
- IEEE Baseband DLC — Provides the VRM device manager for an IEEE 802.2 compatible data link control that will operate on a baseband device driver, using IEEE 802.3 medium access control protocol procedures.
- Multiprotocol Dual Port (MPDP) VRM Device Driver + Microcode — Provides the VRM block I/O device driver that controls the multiprotocol adapter.
- Small Computer Systems Interface (SCSI) VRM Device Driver — Provides the VRM device driver that controls the SCSI adapter for IBM 9332 DASD attachment.
- Synchronous Data Link Control (SDLC) — Provides the VRM device manager for a half-duplex SDLC data link control that will operate on a multiprotocol dual port VRM device driver.
- Standard Baseband DLC — Provides the VRM device manager for an IEEE 802.2 compatible data link control that will operate on a baseband device driver, using standard baseband medium access control protocol procedures.
- Token-Ring DLC — Provides the VRM device manager for an IEEE 802.2 compatible data link control that will operate on a token-ring device driver, using IEEE 802.5 medium access control protocol procedures.
- Token-Ring Diagnostics — Provides the user with an analysis and a report of certain error data reported by a token-ring adapter.
- Token-Ring VRM Device Driver — Provides the VRM block I/O device driver that controls the IBM token-ring network RT adapter.

See “Minidisk Size Requirements” on page 1-16 for information on the required block sizes of each component. For additional information about these components, see the following publications:

- Kernel device drivers - *AIX Operating System Technical Reference*
- VRM device drivers - *VRM Device Support*
- Data link control (DLC) - *VRM Device Support*
- Token-ring diagnostics - *Managing the AIX Operating System*.

SNA Services

SNA Services enables application programs to communicate with cooperating applications within an SNA network. The cooperating applications must reside on the systems that are connected through data communication facilities. SNA Services is included with the AIX Operating System, Version 2.1 and above.

SNA Services provides the following:

- An API (APPC) to LU 6.2
- An API to LU 1,2,3
- Profile Services, which provides a menu interface for configuring, changing, and saving network information.

SNA Services operates over the following communications facilities:

- Token-Ring local area network, using LU 6.2 or LU 1,2,3
- Standard Ethernet local area network, using LU 6.2
- IEEE 802.3 local area network, using LU 6.2 (see note)
- SDLC RS232C telephone network, using LU 6.2 or LU 1,2,3
- SDLC X.21 data network, using LU 6.2 or LU 1,2,3
- X.25 packet network, using LU 6.2 or LU 1,2,3 (see note).

Note: Hardware and device driver software are not included in the current IBM offering for this communication facility.

SNA Services provides several interfaces to allow an application program access to SNA resources. Using these interfaces, a program can transfer data over a network without being concerned with the details of a specific network protocol. Depending on the level of control and portability between different systems, a programmer can choose one of the following interfaces:

- **SNA Library**—This library provides a collection of subroutines to be called from a C language program. The subroutines provide a standardized interface that allows easier portability of programs to other systems using SNA networks.
- **System Program Controller Library**—This library provides a collection of subroutines that allow a C language program to start and stop a server program that runs under the control of the system program controller. SNA Services is such a server program.
- **Standard I/O Library**—This library is part of the standard C language library. Programs that use this library for input/output to standard input and output can also access the SNA network through redirection of I/O.

-
- **System Calls**—The standard set of I/O system calls (**open**, **close**, **read**, **write**, **ioctl**, **readx** and **writex**) can be used to access the SNA network through the multiplexed device driver, **/dev/sna**.

Update to Operating System

You may have received an update diskette with your other diskettes. If so, it contains updates and enhancements to one or more of the AIX Operating System programs and should be installed after you install all of the AIX Operating System programs. To update one or more of the AIX Operating System programs using the update diskette, see “Updating Additional Programs” on page 5-15.

Installing Additional Programs

Locate in the diskette binder the diskettes for the additional programs you want to install.

Remember, it is important to install the programs in the order in which you expect to use them most. You may want to install them in the sequence in which they are described in the previous section.

If you are a client in an active code-service environment and want to use the following programs, they must be installed both on the server and on the client:

- 3278/79 Emulation
- Personal Computer AT Coprocessor Services
- Base PC Network Services.

To install the additional programs, you use the **installp** command. The installation process described on the next page is essentially the same for each of the programs. You may see some variation in the wording and messages on the screen, but the steps are very similar.

Should an error message display on the screen, see *Messages Reference* for details. See *AIX Operating System Commands Reference* for a detailed discussion of the **installp** command.

```
pt even --> parity even
pt odd  --> parity odd
pt none --> parity none
pt space --> parity none
pt mark --> parity none
```

Deleting a Terminal

Edit the **/etc/ports** file to delete the entry associated with the tty that you deleted. You must delete one stanza from **/etc/ports**. For example, if tty0 is deleted from the system but special processing fails, delete stanza tty0 from the **/etc/ports** file.

Tape

When a streaming tape drive is added to the system through the **devices** command, the default dump device becomes the tape instead of diskette. This is accomplished by changing the **backupdev** and **backuplen** keywords in the **/etc/filesystems** file to be the values for tape. The **backupdev** keyword value is set to **/dev/rmt0**, and the **backuplen** keyword value is set to **2700**. When the streaming tape drive is deleted from the system configuration, the values are changed back to the diskette values; **backupdev** is set to **/dev/fd0** and **backuplen** is set to **2400**.

When special processing fails, take these actions when adding or deleting a tape.

Adding a Tape

Edit the **/etc/filesystems** file to change two keywords in the default stanza:

```
default:
    backupdev = /dev/rmt0
    backuplen = 2700
```

Ignore other keywords in the default stanzas.

Deleting a Tape

Edit the **/etc/filesystems** file to change two keywords in the default stanza:

```
default:
    backupdev = /dev/fd0
    backuplen = 2400
```

Ignore other keywords in the default stanzas.

Floating-Point Accelerator

When a floating-point accelerator is added to the system through the **devices** command, the **floating** keyword in the sysparms section of the **/etc/master** file is changed from the value **software** to the value **hardware**.

When special processing fails, take these actions when adding or deleting a floating-point accelerator.

Adding a Floating-Point Accelerator

Edit the sysparms stanza in the **/etc/master** file to change the **floating** keyword:

```
sysparms:  
    floating = hardware
```

Ignore other keywords in the default stanzas.

Deleting a Floating-Point Accelerator

Edit the sysparms stanza in the **/etc/master** file to change the keyword **floating**.

```
sysparms:  
    floating = software
```

Ignore other keywords in the default stanzas.

IBM 9332 DASD Attachment

When you delete an IBM 9332 DASD Attachment from the system, the VRM is informed that the disk is no longer available and the **mdrc** command is run to remove the information in the configuration files for the minidisks on this disk. This special processing might fail if one of the minidisks on the disk is still mounted. If this processing fails, the disk may not be deleted or the configuration files may not be in sync.

Deleting the IBM 9332 DASD Attachment

After the system startup, the disk will be completely deleted. Then, you should run the following command:

```
mdrc -h hdisk#
```

hdisk# is the system name of the disk you deleted. By running this command, you will remove the information in the configuration files for the minidisks on the disk.

Minidisks

While adding an AIX minidisk, you may receive a message that the *special processing* has failed. Special processing automatically creates a lost+found directory for the added minidisk. This process may fail if the **minidisks** command was not able to mount the minidisk or create the lost+found directory. In such cases, the minidisk is added, but the lost+found directory must be created manually.

Follow these steps to create the lost+found directory:

1. Create the minidisk mount directory: `mkdir <dir name>`
2. Mount the minidisk: `mount <dir name>`
3. Change to the mounted directory: `cd <dir name>`
4. Make the lost+found directory: `mkdir lost+found`
5. Create the lost+found entries by running the shell procedure below from the mount directory. Type this shell procedure in a file and run it:

```
cd lost+found

for i in a b c d e f g h i j k l m n o
do
    for j in 0 1 2 3 4 5 6 7 8 9
    do
        >${i}$j
    done
done
for i in a b c d e f g h i j k l m n o
do
    for j in 0 1 2 3 4 5 6 7 8 9
    do
        rm ${i}$j
    done
done
```

The cross product of **i** and **j** is the number of entries you want in your lost+found directory. The algorithm used by the **minidisks** command to produce this number is described in Chapter 7, "Customizing System Minidisks."

Appendix D. Installing the VRM with Non-IBM RT Display

If you intend to install the AIX Operating System VRM with a display other than that usually shipped with the IBM RT, you must have either of the following:

- A display that is hardware-compatible with the IBM RT so that it can communicate with existing VRM device drivers
- For components that are not hardware-compatible, a program diskette containing the device driver and other modules necessary to make the display compatible with the VRM.

If your components are compatible with the IBM RT, then you can install the VRM as explained in the first three chapters of this book. But if your components are not compatible with the IBM RT, then you should be able to install the VRM using the two-digit display on your IBM RT system unit.

Note: It is possible that you may have purchased an IBM RT display but also have purchased an additional display from another manufacturer. If so, you should have received a program diskette with the component and instructions from the manufacturer on updating the VRM minidisk with the device information from the program diskette. If you have an IBM RT display, you can install the VRM as described in the first three chapters of this book. After installing the VRM, you can then install your program diskette by choosing item 6 (*Install Updates to the Virtual Resource Manager*) from the INSTALL AND CUSTOMIZE THE VIRTUAL RESOURCE MANAGER menu described in Chapter 3, "Installing the VRM Program."

To Install the VRM Using the Two-Digit Display

1. Open the door to diskette drive 0 (turn the lever counterclockwise). Insert the appropriate VRM diskette. Close the drive door (turn the lever clockwise).
2. Turn the key in the keylock to the unlocked position.
3. Turn on the power switches to your system components.
4. When the number 45 flashes on the two-digit display on the system unit, remove the VRM diskette and insert the program diskette for the display and close the drive door. The number on the two-digit display will disappear while the diskette is being read.
5. Follow the prompts on the display screen to remove the program diskette and insert the VRM diskette. Also, read the additional information in the notes below. Then turn to Chapter 2, "Getting Ready to Install the AIX Operating System," to read about the various options available to you.

Notes:

1. Once the IBM RT recognizes that a display is present, the flashing 45 will no longer show on the two-digit display.
2. If the flashing 45 reappears after the system has processed the program diskette for your display, contact the supplier from which you received your diskette and explain the problem. If a number other than the 45 flashes on the two-digit display, see the *Problem Determination Guide* for information on how to proceed.
3. After you have installed the VRM, you will be asked whether you wish to update the VRM minidisk with information about the display from the program diskette. Follow the prompts to do so at this point.

Appendix E. Conflicting Adapter Levels

The adapters you choose for your system can conflict in two ways: interrupt level or direct memory addressing (DMA) channel.

Conflicting Interrupt Levels

All interrupt levels on the RT system can be shared. Some adapters are designed to either allow or not allow interrupt sharing. Two or more adapters that support interrupt sharing can share the same interrupt level. Only one non-sharing adapter can be assigned to a given interrupt level.

Refer to the Interrupt and DMA Usage Chart, Figure E-1 on page E-4, to ensure that your adapters do not have conflicting interrupt levels.

Conflicting DMA Channels

Each DMA channel can be used by one adapter at a time. DMA channel conflicts usually can be resolved by changing DMA channel on the applicable adapter. "Examples" on page E-6 shows you how to resolve DMA channel conflicts using both hardware and software methods.

Refer to the Interrupt and DMA Usage Chart, Figure E-1 on page E-4, to ensure that your adapters do not have conflicting DMA channels.

Determining Adapter Conflicts

Figure E-1 on page E-4 shows the interrupt levels and DMA channels used by various adapters.

Make a list of all the adapters you intend to use in one machine. To the right of the adapter list create two columns, one for interrupt levels and one for DMA channels.

If any DMA channel appears twice, a conflict exists and must be resolved using the methods shown in "Examples" on page E-6.

If an interrupt level appears twice or more, determine whether the conflicting adapters have changeable or shareable interrupt levels. Then refer to the installation instructions for the conflicting adapters.

Interrupt and DMA Usage																			
Device/Adapter	Interrupt Level											DMA Channel							
	3	4	5	6	7	9	10	11	12	14	15	0	1	2	3	5	6	7	8
Extended ESDI Fixed-Disk and Diskette Drive ^{1 2 3}				DX					(O)	(O)		FO	FO	DX	FO				
ESDI Fixed-Disk and Diskette Drive				DX						FX				DX					
Personal Computer AT Fixed Disk and Diskette Drive				DX						FX				DX					
SCSI ^{2 10}									(O)	(O)		O	O		O	O	O	O	
Streaming Tape										(X)									
5081 Display Adapter ¹¹									(X)							O	O	OD	
5081 Printer Port (optional)					X														
Advanced Mono. Graphics									(X)										
Extended Mono. Graphics ¹⁰									(X)										
Advanced Color Graphics									(X)										
Enhanced Graphics ⁴						X													
Mono./Printer					X														
Multiprotocol								(O)	(O)				OD			O			
Token-Ring ¹⁰									(O)	(O)						O	OD	O	O
3278/79 Emulation ⁴						X													
PC Network ⁶	O					O									X				
Baseband Network ^{8 9}	O	O	O		O														
Personal Computer AT Serial/Parallel Adapter	SO	SO	PO		PO														
4-Port Asynchronous						(O)	(O)	(O)											
8-Port Asynchronous	(OD)	(O)				(O)													
5080 Peripheral Attachment						(O)	(O)	(O)											
5080 Attachment ⁵							(X)									O	OD	O	
Personal Computer AT Coprocessor Option											(X)								X
6150 Serial Port 2 ⁷												O		O					
6150 Serial Port 1													O		O				
S/370 Host Interface ⁵							(X)								OD		O	O	
Portable Disk Drive (Primary)				DX					(O)	(OD)		FO	FO	DX					
Portable Disk Drive (Secondary)				DX					(O)	(OD)				DX	FX				

X - Required
O - Optional
OD - Optional Default
(Shipped W/This Setting)

() - Shareable
PO - Optional for Parallel
SO - Optional for Serial

DX - Required for Diskette
FX - Required for Fixed-Disk
FO - Optional for Fixed-Disk

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Figure E-1. Interrupt and DMA Usage Chart

E-4 Installing and Customizing the AIX Operating System

Table Notes:

1. Level 6 is used in nonshared mode for compatibility, or levels 12 and 14 can share for a new mode.
2. Optional interrupt levels and DMA channels can be set through software.
3. DMA channel 3 is only available when a second Extended ESDI Adapter is used.
4. The Enhanced Graphics Adapter (EGA) and 3278/79 Emulation Adapter can be used together; at this printing, there is no known program that uses interrupt level 9 on the EGA. This interrupt should be disabled on the EGA.
5. IBM application software supports only the default DMA channels for these adapters.
6. When this adapter is used with the Personal Computer AT Coprocessor Option or with a version of the AIX Operating System that is earlier than Version 2.1, this adapter requires DMA channel 3. Otherwise, this adapter does not use DMA channel 3.
7. The AIX Operating System restricts Serial Port 2 to use of DMA channel 0; DMA channel 2 is used by diskette adapter. DMA channel 2 may be available when other operating systems are used.
8. Only two adapters per configuration are supported.
9. This card will not work in slot 8 of the 6150 or slot 5 of the 6151.
10. This card will not work in slot 8 of the 6150 or slot 5 of the 6151 when DMA channel 7 is used.
11. This card must be plugged into slots 4 and 5 of the 6150 and slots 2 and 3 of the 6151.

General Notes:

1. Do not install an 8-port adapter on the same interrupt level as a 4-port adapter or a Serial/Parallel Adapter.
2. When multiple adapters are used, each adapter must be set to a different DMA channel.

Examples

The following examples show two ways that DMA channels can be changed. The first example changes the Extended ESDI Adapter DMA channels by using the **setdma** command. The second example involves changing all types of adapter channels.

Example 1

Configuration — 1 Extended ESDI Adapter, 2 Multiprotocol Adapters

In this configuration, you are installing one extended ESDI Adapter and two Multiprotocol Adapters.

Use the following procedure to change Extended ESDI Adapter DMA channels:

1. Power on.
2. Log on.
3. Look at Figure E-1 on page E-4. This chart tells you:
 - a. The primary Extended ESDI Adapter can use channels 0 or 1 optionally for the fixed disk (F0). Channel 2 is required for the diskette drive (DX).
 - b. The Multiprotocol Adapter uses channel 1 or 5 optionally (O), with channel 1 being the default (OD).
4. Since you require two Multiprotocol Adapters, both channels 1 and 5 must be used, leaving a conflict with the default setting of the Extended ESDI Adapter on DMA channel number 1.

-
5. To choose DMA channel 0 (instead of 1) for the Extended ESDI Adapter, you are changing the DMA channel used by the adapter. To do this type of change, use the **setdma** command:

```
setdma eesdi 0
```

The changes will be effective when you re-IPL your system.

Since Serial Port 2 uses DMA channel 0, you will not be able to use Serial Port 2.

Example 2

Configuration — One Serial Port 1, Personal Computer AT Coprocessor Services with the PC Network Adapter¹, Multiprotocol Adapter

In this configuration, you have one printer attached to Serial Port 1. You will add devices that are attached to a PC Network Adapter¹ and a Multiprotocol Adapter.

Use the following procedure to add these devices:

1. Power on.
2. Log on.
3. Look at Figure E-1 on page E-4. This chart tells you:
 - a. Serial Port 1 can optionally use channels 1 or 3 (O), where 3 is the default channel (OD).
 - b. The PC Network Adapter¹ is required to use DMA channel 3 (X).
 - c. The Multiprotocol Adapter can optionally use channels 1 or 5 (O), where channel 1 is the default channel (OD).
 - d. The Personal Computer AT Coprocessor Services is required to use DMA channel 8 (X).
4. No change is required to use Personal Computer AT Coprocessor Services.
5. Serial Port 1 is already using DMA channel 3.
6. To change the DMA channel for Serial Port 1, use the **devices** command. See *IBM RT Installing and Customizing the AIX Operating System* to aid you in changing the channel assignment from channel 3 to channel 1 using the **cn** keyword.
7. To add a Multiprotocol device to your system, you must add a Multiprotocol adapter which uses channels 1 and 5 optionally (O), with channel 1 being the default channel (OD).
8. To change a Multiprotocol Adapter channel setting, you must change the hardware setting as well as the software setting. Change the software setting as you did in the previous step by changing the channel settings from channel 1 (which is the default setting) to channel 5. Changing the hardware setting requires you to change the jumper setting. To change the jumper setting, see *User Setup Guide and Options Installation*.

¹ IBM no longer sells or supports the PC Network Adapter.

9. You now have the following DMA channel settings:

- Serial Port 1 — DMA channel 1
- PC Network Adapter² — DMA channel 3
- Multiprotocol Adapter — DMA channel 5
- Personal Computer AT Coprocessor Services — DMA channel 8.

The changes will be effective when you re-IPL your system.

² IBM no longer sells or supports the PC Network Adapter.

Glossary

adapter. An electronic part used to connect two unlike parts or machines.

allocate. To assign a resource, such as a disk file or a diskette file, to perform a specific task.

append. The action that causes data to be added to the end of existing data.

application. (1) A particular task, such as inventory control or accounts receivable. (2) A program or group of programs that apply to a particular business area, such as the Inventory Control or the Accounts Receivable application.

application program. A program used to perform an application or part of an application.

backup diskette. A diskette containing information copied from another diskette. It is used in case the original information is unintentionally destroyed.

Base System Program. The kernel portion of the AIX Operating System. See also *Virtual Resource Manager*.

block. A group of records that is recorded or processed as a unit.

byte. The amount of storage required to represent one character; a byte is 8 bits.

cancel. To end a task before it is completed.

client. A system that is dependent on a server to provide it with programs and/or access to programs.

code service. A process where one or more server systems provides access through a distributed services network for client systems

to the code and functions of AIX programs and licensed programs.

configuration. The group of machines, devices, and programs that make up a computer system.

cursor. A movable symbol (such as an underline) on a display, usually used to indicate to the operator where to type the next character.

default. A value that is used when no alternative is specified by the operator.

device. An electrical or electronic machine that is designed for a specific purpose and that attaches to your computer; for example, a printer, plotter, disk drive, and so forth.

device driver. A collection of routines that control the interface between I/O device adapters and the operating system. The primary components of an RT device driver are the device head, device handler, and device manager.

diagnostic. Pertaining to the detection and isolation of an error.

diskette. A thin, flexible magnetic plate that is permanently sealed in a protective cover. It can be used to store information copied from the disk.

diskette drive. The mechanism used to read and write information on diskettes.

display screen. The part of the display device that displays information visually.

emulation. Imitation; for example, when one computer imitates the characteristics of another computer.

enable. To make functional.

file index. Sixty-four bytes of information describing a file. Information such as the type and size of the file and the location on the physical device on which the data in the file is stored is kept in the file index. This index is the same as the AIX Operating System i-node.

fixed disk. A storage device made of one or more flat, circular plates with magnetic surfaces on which information can be stored.

floating point. In the RT, a way of representing real numbers (that is, values with fractions or decimals) in 32 bits or 64 bits. Floating-point representation is useful to describe very small or very large numbers.

font. A family or assortment of characters of a given size and style.

format. (1) A defined arrangement of such things as characters, fields, and lines, usually used for displays, printouts, or files. (2) The pattern that determines how data is recorded.

hardware. The equipment, as opposed to the programming, of a system.

index. See *file index*.

initial program load (IPL). The process of loading the system programs and preparing the system to run jobs.

i-node. The internal structure for managing files in the system. I-nodes contain all of the information pertaining to the node, type, owner, and location of a file. A table of i-nodes is stored near the beginning of a file system.

interface (n). A shared boundary between two or more entities. An interface might be a hardware component to link two devices together, or it might be a portion of storage or registers accessed by two or more computer programs.

IPL. See *initial program load*.

keyboard. An input device consisting of various keys allowing the user to input data, control cursor and pointer locations, and to control the user/work station dialogue.

keyword. One of the predefined words of a programming language; a reserved word.

licensed program. Software programs that remain the property of the manufacturer, for which customers pay a license fee.

megabyte (M byte). 1,048,576 bytes.

memory. Storage on electronic memory such as random access memory, read only memory, or registers. See *storage*.

message. Information displayed about an error or system condition that may or may not require a user response.

minidisk. A logical subdivision of a fixed disk that has its own virtual device address.

modem. A device that converts data from the computer to a signal that can be transmitted to a communications line and converts the signal received to data for the computer.

network. A collection of products connected by communication lines for information exchange between locations.

operating system. The programs and procedures designed to cause a computer to function, enabling the user to interact with the system.

page space minidisk. The area on a fixed disk that temporarily stores instructions or data currently being run. See also *minidisk*.

paging. The action of transferring instructions, data, or both between real storage and external page storage.

parameter. Information that the user supplies to a panel, command, or function.

prompt. A displayed request for information or operator action.

protocol. In data communications, the rules for transferring data.

queue. A line or list formed by items waiting to be processed.

screen. See *display screen*.

sector. (1) An area on a disk track or a diskette track reserved for recording information. (2) The smallest amount of information that can be written to or read from a disk or diskette during a single read or write operation.

server. A system that contains most of the data files or programs that the client reads.

software. Programs.

stanza. A group of lines in a file that together have a common function. Stanzas are usually separated by blank lines, and each stanza has a name.

storage. In contrast to memory, the saving of information on physical devices such as fixed disk or tape. See *memory*.

store. To place information in memory or onto a diskette, fixed disk, or tape so that it is available for retrieval and updating.

subroutine. (1) A sequenced set of statements that may be used in one or more computer programs and at one or more points in a computer program. (2) A routine that can be part of another routine.

system. The computer and its associated devices and programs.

system unit. The part of the system that contains the processing unit, the disk drive and the disk, and the diskette drive.

two-digit display. Two seven-segment light-emitting diodes (LEDs) on the operating panel used to track the progress of power-on self-tests (POSTs).

Virtual Resource Manager (VRM). A portion of the Base System Program that provides various services, interfaces, and runtime routines, through which AIX controls the RT hardware and peripherals.

VRM. See *Virtual Resource Manager*.

VRM minidisk. An area on a fixed disk on which the Virtual Resource Manager resides.

work station. A device that includes a keyboard from which an operator can send information to the system and a display screen on which an operator can see the information sent to or received from the computer.

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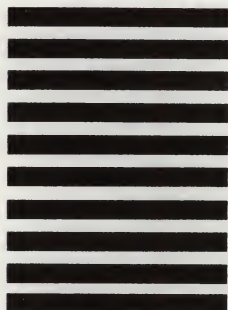
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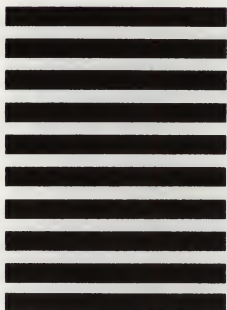
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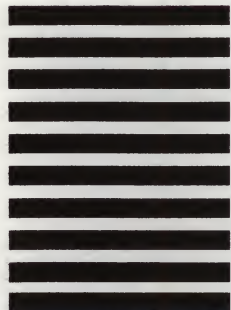
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